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Abstract

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IMPLICATIONS OF METHOD-BASED DIFFERENCES
IN MEASURING JOB CHARACTERISTICS

Richard S. Tallarigo, Sr.

A Dissertation

Submitted to the Graduate College of Bowling Green
State University in partial fulfillment of
the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 1988

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Abstract

The overall objective of this study was to examine if and how workers' self-reports of job characteristics were related to independently rated characteristics for those jobs. Ratings of job characteristics by 223 workers in sixteen jobs were obtained on scales developed by Hackman and Oldham (1975) and Zaccaro and Stone (1988). Independently rated characteristics were derived from job analysts' ratings on the Position Analysis Questionnaire (PAQ; McCormick, Jeanneret, & Mecham, 1969). After assessing interrater agreement on the PAQ ratings, characteristics derived from the PAQ ratings were related by canonical correlation analysis to characteristics reported by workers. Three significant canonical functions were interpreted. The three PAQ-derived variates predicted 60% of the variance in worker-reported characteristics; and the three variates derived from workers' job perceptions predicted 51% of the variance in the PAQ-derived characteristics. Results suggested that (a) characteristics in addition to those proposed by Hackman and Oldham (1975) were useful for defining job characteristics, (b) self-reported job characteristics were related to independently measured PAQ job characteristics, and (c) further research is needed on the use of behavior-based job characteristics in job redesign.

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Finally, to my parents goes special thanks. And to my mother, who as a young immigrant learned the hard lessons of persistence and later taught them to her children, I gratefully dedicate this work.

The statements and conclusions in this paper are those of the author, and do not represent official positions of the United States Air Force.

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Implications of Method-Based Differences in Measuring Job Characteristics

Jobs that are enriched (i.e., have high levels of skill variety, task identity, task significance, autonomy, and feedback from the job itself) tend to be associated with desirable job attitudes and performance (Loher, Noe, Moeller, & Fitzgerald, 1985; Spector, 1985; Stone, 1986). Controversy regarding these relationships has developed, however, because of the common practice of using incumbents' self-reports of job characteristics as a basis for job redesign and as predictors of job attitudes and performance (Roberts & Glick, 1981; Salancik, 1984; Salancik & Pfeffer, 1977, 1978; Thomas & Griffin, 1983). As a result, there is a need to study relationships between job characteristics rated by incumbents (i.e., perceived job characteristics) and those assessed independently (Dunham, Aldag, & Brief, 1977). As is discussed below, such relationships have been studied in several ways. In the present research, independently rated characteristics were derived from job analyses conducted independently of incumbents' self-reports.

To date, few published studies have empirically studied the use of job analysis to map relationships between incumbents' self-reports of job characteristics and activities actually performed on the job. In the

present study, the job analysis method used was the Position Analysis Questionnaire (PAQ, Form B; McCormick, Jeanneret, & Mecham, 1969, 1972). Incumbents' ratings of job characteristics were obtained with scales from previous research. (See Appendix A for definitions of incumbent-rated job characteristics used in the present study).

The following section presents a variety of approaches to the study of job characteristics and discusses how the validity of incumbent-rated job characteristics has been studied. Then, the importance of studying relationships between incumbent-rated job characteristics and characteristics resulting from independent job analysis is discussed. Finally, an hypothesized relationship between incumbent-rated and independently rated job characteristics is tested.

Job Characteristics Models

Historical Approaches

An historical introduction to current job characteristics research could begin in the early studies of assembly line work, job redesign, and the effects of division of labor under scientific management (e.g., Walker & Guest, 1952). A useful starting point, however, is Herzberg's two factor theory of job satisfaction, which developed in the 1950's and grew into a theory of job enrichment and work motivation (Herzberg, 1966; Herzberg, Mausner, & Snyderman, 1959).

This motivation-hygiene theory holds that jobs characterized by motivators (such as recognition, achievement opportunity, responsibility, personal growth in competence) enhance work motivation, satisfaction, and performance. Hygiene factors (such as company policies, supervisory practices, pay, working conditions, co-workers), on the other hand, produce at best a neutral state of motivation, satisfaction, or performance. Herzberg's theory stimulated a great amount of research on the effects of job enrichment. The theory's results, however, were overly dependent upon self-report methods and were not well supported in subsequent studies (e.g., Dunnette, Campbell, & Hakel, 1967).

Although flawed in certain respects, the work of Turner and Lawrence (1965) stimulated efforts to (a) develop a taxonomy of job characteristics, (b) relate incumbent-rated and independent job characteristics to one another and to job outcomes, and (c) examine possible moderators of the effects of job characteristics on job outcomes. While each of these remains relevant to research on job characteristics, the first two contributions are of interest to the present study.

Turner and Lawrence noted that the job characteristics that they investigated represented an arbitrary selection of possible characteristics. Their

Perceived Task Attributes Index and Requisite Task Attributes Index measured variety (object and motor), autonomy, required interaction, optional interaction, knowledge and skill, and responsibility. Turner and Lawrence (1965) realized that characteristics such as physical or muscular effort, dexterity requirements, bodily harm potential, or even the required number of hours of work per day could have been used in their taxonomy. Current research continues to explore taxonomies of job characteristics (Dunham, 1976; Fried & Ferris, 1986, 1987; Pierce & Dunham, 1978a; Rousseau, 1978; Stone & Gueutal, 1985).

More germane to present purposes, however, Turner and Lawrence (1965) recognized the importance of obtaining both incumbents' self-reports of job characteristics (using the Perceived Task Attributes Index) and independent observers' ratings (using the Requisite Task Attributes Index). Although Turner and Lawrence reported that the two scales were "closely related" (p. 16), they did not report a quantitative index of association. Stone and Porter (1978), using Turner and Lawrence's (1965) data, calculated the coefficient of contingency between the two scales and found that it was only $C=.29$. (The maximum C attainable, with the five Turner and Lawrence categories, is .894; Guilford, 1965).

Following on the work of Turner and Lawrence (1965), Blood and Hulin (1967) and Hulin and Blood (1968) argued that effects of job design are dependent upon workers' alienation from or integration with middle class norms. Unlike Turner and Lawrence (1965), however, Blood and Hulin (1967) measured job design only with self-reported ratings of job level. That is, the job designs were not directly assessed with job characteristics measures, nor were they assessed independently of the incumbents.

As indicated in the following section, job characteristics research since Turner and Lawrence (1965) has been dominated by incumbents' self-reports of job characteristics similar to those proposed by Turner and Lawrence.

Current Approaches

The Job Characteristics Model. Hackman and Lawler (1971) and Hackman and Oldham (1974, 1975, 1976, 1980) elaborated upon the taxonomy and measurement strategies of Turner and Lawrence (1965). Hackman and Lawler (1971) developed the Yale Job Inventory, which measured the job characteristics of skill variety, autonomy, task identity, and feedback from the job itself. They also introduced the now common practice of using incumbents' ratings as the principal means of measuring job characteristics. Hackman and Oldham (1974, 1975) developed the Job Diagnostic Survey to obtain

incumbents' ratings of job characteristics; and they developed the Job Rating Form to measure the same job characteristics but from the supervisor's perspective. Both instruments include measures of five core job characteristics: the four Yale Job Inventory characteristics plus task significance. (Another instrument, the Job Characteristic Inventory [Sims, Szilagyi, & Keller, 1976], measures similar incumbent-rated job characteristics but is not as popular as the Job Diagnostic Survey.) In addition, Hackman and Oldham (1975) introduced the Job Characteristics Model, which relates a job's motivating potential score to three critical psychological states (experienced meaningfulness, experienced responsibility, and knowledge of results) and four personal and work outcomes. The motivating potential score for a job was defined as: $[(\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}) / 3] \times \text{Autonomy} \times \text{Feedback}$. In a sample of 658 employees in 62 different jobs in seven organizations, this composite correlated in predicted directions with outcomes including performance, absenteeism, general satisfaction, growth satisfaction, and intrinsic work motivation.

The Hackman and Oldham (1975, 1976, 1980) Job Characteristics Model has been the most influential model in the organizational behavior discipline for diagnosing job characteristics prior to job redesign

(O'Brien, 1982; Staw, 1984). Although numerous studies have supported some of the basic propositions of the Hackman and Oldham model (e.g., Brief & Aldag, 1975; Evans, Kiggundu, & House, 1979; Hackman, Pearce, & Wolfe, 1978; Lee, McCabe, & Graham, 1983; Umstot, Bell, & Mitchell, 1976), the model has not gone uncriticized or unmodified. Some examples of criticism are:

1. The model excludes organizational and role characteristics (Kelly, 1982).
2. The motivating potential score is no more effective than a unit-weighted additive composite in predicting response variables (Dunham, 1976; Fried & Ferris, 1987; Pierce & Dunham, 1976).
3. The critical psychological states have received mixed empirical support (Arnold & House, 1980; Walsh, Taber, & Beehr, 1980).
4. Numerous failures have been experienced in replicating the moderating effects of growth need strength (Graen, Scandura, & Graen, 1986) and other higher-order needs (Stone, 1975; Stone, Mowday, & Porter, 1977). Other studies have demonstrated unmoderated relationships (e.g., Allen & Bell, 1980; Dunn & Feiler, 1983; Johnson & Butler, 1982; Lindell, Walsh, Drexler, & Lawler, 1980; Stone, 1986).
5. The construct validity of the scales that measure growth need strength has been challenged (Stone, Ganster, Woodman, & Fusilier, 1979).

6. The five-factor structure of the Job Diagnostic Survey has frequently not been confirmed and other dimensional solutions have been found (Dunham, 1976; Dunham, Aldag, & Brief, 1977; Fried & Ferris, 1986, 1987; Harvey, Billings, & Nilan, 1985; Pierce & Dunham, 1978a).

7. Finally, the validity of the model's incumbent-rated job characteristics has been questioned (Aldag, Barr, & Brief, 1981; Brief & Aldag, 1978; Staw, 1984).

In assessing the validity of their incumbent-rated job characteristics, Hackman and Lawler (1971) and Hackman and Oldham (1975) examined (a) the convergence with supervisors' and observers' ratings on the same characteristics, and (b) the ratio of between-jobs variance to within-job variance in incumbent-rated job characteristics. Hackman and Oldham (1975) concluded that the convergent validity was moderate (median correlation among the three sources was .51) and the between-jobs variance was significant for each characteristic. Nevertheless, the validity of incumbent-rated job characteristics continues to be an important research issue. For critical reviews of the Job Characteristics Model and the need satisfaction theory upon which it is based, see Roberts and Glick (1981) and Salancik and Pfeffer (1977, 1978). A major narrative and quantitative review generally supportive of the Job

Characteristics Model was provided recently by Fried and Ferris (1987).

An interdisciplinary approach. The Hackman and Oldham model is but one of several job design approaches. For example, Campion and Thayer (1985, 1987) developed the Multimethod Job Design Questionnaire (MJDQ) which, in addition to motivation-oriented job design characteristics, assesses mechanistic, biological, and perceptual-motor characteristics. The MJDQ requires on-site structured observation and interviews rather than self-reports; and it has demonstrated discriminant validity and interrater agreement. From a practical standpoint, the MJDQ demonstrates that job redesign strategy affects redesign outcomes. For example, although the motivational characteristics (e.g., autonomy, feedback, task identity, etc.) were positively correlated with job satisfaction and physical comfort, they were negatively related to worker efficiency and performance reliability. Likewise, mechanistic characteristics such as motion economy or task and skill simplification, while positively related to efficiency and reliability, were negatively related to satisfaction. Thus, it may be important to consider tradeoffs among outcomes when selecting the characteristics upon which job redesign will be based. Structured observation techniques such as the MJDQ, however, have disadvantages of high cost and

can be disruptive at the worksite (Jenkins, Nadler, Lawler, & Cammann, 1975). Because of its emphasis on assessing tradeoffs among alternative job redesign strategies, the MJDQ approach exemplifies the need for and the utility of explicit links between rated job characteristics and actual job activities.

Expanded models. Models that include role variables along with job characteristics were proposed by Walsh, Taber, and Beehr (1980) and Abdel-Halim (1978). Using path analysis, Walsh et al. (1980) found that role clarity was predicted by supervisory and task feedback and was directly related to global job satisfaction. Abdel-Halim (1978) found that the motivating potential score moderated the effects of role ambiguity and role overload on satisfaction with work itself.

Other research has included job characteristics in tests of sociotechnical systems theory (Emery & Trist, 1965). In this approach, job design research is broader in scope than traditional research concerned solely with the worker-task unit (Davis, 1979). Examples of sociotechnical approaches to models of job design are provided by Brass (1981, 1985), Lindell, Walsh, Drexler, and Lawler (1980), Rousseau (1977, 1978), Roznowski and Hulin (1985), and Sutton and Rousseau (1979). In these studies, a wide range of worker responses was predicted from macro-organizational variables (i.e., structure and technology, environmental characteristics, subunit

[departmental] characteristics) and micro-organizational variables (e.g., job and role characteristics). Research within the sociotechnical systems framework frequently uses macro and micro-level variables within a single analysis. As Pierce and Dunham (1978b) have demonstrated, though, simply aggregating individual (i.e., micro-level) perceptual measures reduces discriminant validity of the macro and micro level variables. They advised that macro-level variables be measured independently of micro-level variables (see also Rousseau, 1987).

An alternate taxonomy. Multidimensional scaling provides an approach to determining dimensions of job characteristics not dependent on a priori models. With this class of procedures, a dimensional solution is fitted to similarity ratings of a wide range of jobs. This provides an empirically based taxonomy of perceived job characteristics. Such an approach was taken by Stone and Gueutal (1985) and Stone and Ruddy (1987). The resulting three dimensional solution included job complexity (primarily a combination of the Hackman and Oldham core characteristics, i.e., job scope), public service/interaction, and physical demands/dangerousness. These three job characteristics provide an alternative to those traditionally measured by instruments such as the Job Diagnostic Survey or Job Characteristics Inventory. This trichotomy provided significant

incremental validity for the prediction of satisfaction with work over the traditional job characteristics (Zaccaro & Stone, 1988).

Non-Job Influences on Perceptions of Job Characteristics

Factors other than job design may influence job perceptions. These include the social context of the worker (as described in Social Information Processing theory, Salancik & Pfeffer, 1977, 1978) and individual differences among the workers. The premise of Social Information Processing theory is that social environments exert significant influence on expressed needs and attitudes by (a) providing norms for socially acceptable beliefs, attitudes, and needs, and (b) making certain information more salient. According to this view, self-reported job characteristics may represent evaluations considered important in workers' social contexts rather than reflections of actual job characteristics. Consequently, using self-reported measures of job characteristics is heavily criticized by the proponents of Social Information Processing theory. As an example, Shaw (1980) described incumbent-rated job characteristics as heavily influenced by social cues and invalid as measures of job characteristics. He proposed using information integration and judgment models to predict job perceptions.

The degree to which Social Information Processing theory affects job characteristics theory and methods has been vigorously researched and debated (Salancik, 1984; Stone, 1984; Stone & Gueutal, 1984). For example, experiments that manipulated task characteristics and social information cues about the task found significant main effects for both factors on perceived task characteristics. Field research, however, has generally provided less consistent support for the Social Information Processing approach (Glick, Jenkins, & Gupta, 1986; Thomas & Griffin, 1983). Stone (1987), moreover, criticized Social Information Processing theory on the grounds that it overstates the strength of priming and consistency effects in job characteristics-job attitude relationships.

In addition to social influences, individual differences among workers have been shown to influence perceptions of job characteristics. Altogether, individual differences in cognitive complexity, self-esteem, span of attention, field dependence, education level, age, and dominance have been found to influence incumbents' ratings of job characteristics (Aldag & Brief, 1979; Blau, 1983; Schwab & Cummings, 1976; Stone, 1979; Thomas & Griffin, 1983). Such findings suggest that identical job characteristics can be perceived differently. These findings also suggest the need to examine the convergent and discriminant validity of

incumbent-rated job characteristics (e.g., Birnbaum, Farh, & Wong, 1986; Glick, Jenkins, & Gupta, 1986; see also Hogan & Martell, 1987). These studies found significant method effects in relationships between incumbents' ratings of job characteristics and work satisfaction. As a result, Birnbaum et al. (1986) suggested that future job design research utilize independent observers, including job analysts, in measuring job characteristics. Earlier, Schwab and Cummings (1976) had also suggested that independent operational definitions of job characteristics are critically important and indicated that the PAQ (McCormick et al., 1969) is promising as such a measure.

The Research Problem

Fried and Ferris (1987) framed an important question about the validity of incumbents' ratings of job characteristics: To what extent do they converge with independently assessed characteristics? As Fried and Ferris (1987) observed, the relationship between the actual job and incumbent-rated job characteristics has been the source of much discussion, controversy, and criticism. A preliminary question to address in this area, of course, is: What criteria should be used to assess the validity of incumbent-rated job characteristics? The literature suggests that, at a minimum, four independent criteria have been used: (a) experimentally (or quasi-experimentally) created job

designs, (b) convergence among sources of job characteristics ratings (e.g., peers, incumbents, supervisors, observers), (c) significant differences between job categories in rated characteristics, and (d) results of job analyses.

Fried and Ferris (1987) extensively reviewed research on the first two criteria above. Summarizing their findings, they noted that not all of the reliable variance in incumbents' ratings of job characteristics was explained using the independent criteria. They concluded that other factors such as social cues may be potential sources of variation.

The third method listed above uses existing job categories to validate incumbent-rated characteristics. As recommended by Podsakoff and Organ (1986), the test of interest is whether self-reported characteristics successfully discriminate among job groups. This approach, however, is not an optimal method of testing relationships between incumbent ratings of job characteristics and actual job activities. This is because using intact job groups prevents the control of extraneous group-related influences on incumbents' ratings of job characteristics.

The fourth method, as is discussed below, derives job characteristics from job analysis. This potentially important approach has been largely ignored in research on the motivational characteristics of jobs.

Consequently, the job analysis method of assessing job characteristics, in addition to incumbents' self-reports, is used in the present research.

The discussion below argues that there is a practical need to understand relationships between abstract job characteristics reported by incumbents and discrete work activities described by job analyses. Research is then reviewed suggesting that these relationships are likely to exist.

The Role of Job Analysis in Job Redesign

One purpose of job redesign is to augment the motivational properties of a job by increasing specific characteristics and their composite, job scope (Hackman & Oldham, 1980). The job redesign process, however, assumes explicit relationships between job activities and incumbent-rated job characteristics (Aldag & Brief, 1979; Rousseau, 1982). Most job characteristics research presumes that incumbents' ratings of job characteristics are sufficient measures of existing job characteristics (e.g., Hackman & Oldham, 1975, 1980; Roberts & Glick, 1981). The model of job redesign proposed by Aldag and Brief (1979), however, includes assessment of job characteristics via job analysis.

Identification of job activities through job analysis is one of the first requirements in the redesign process (Aldag & Brief, 1979). Job analysis can be accomplished either through a task inventory (i.e., a

job-oriented analysis; McCormick, 1976) or through a worker-oriented, or functional analysis such as the PAQ (McCormick et al., 1969, 1972).

Once job characteristics are derived from job analysis, links between them and incumbent-rated characteristics can be identified. This process allows determination of which job activities (added or deleted in a job) would influence incumbents' perceptions of job characteristics of interest (e.g., autonomy, variety, feedback, dangerousness, etc.). Aldag and Brief's (1979) approach makes explicit the relationships between perceived job characteristics and job analysis-based characteristics, whereas the Hackman and Oldham (1975, 1980) approach minimizes their importance.

Job Analysis and Incumbent-Rated Job Characteristics

According to Schwab and Cummings (1976), incumbent-rated job characteristics are dependent upon job content, social influences, and/or affective reactions. Using job content to predict rated job characteristics is difficult, however, because few job analysis techniques can assess different jobs on a common scale. In fact, no studies found in this review related independently derived job analysis results to job characteristics rated by job incumbents. To examine relationships between job characteristics produced from job analysis and job characteristics such as measured by the Job Diagnostic Survey, jobs must be analyzed in

terms of a common structure, applicable across a wide variety of jobs. Job analyses that produce job-unique task lists or inventories, for example, provide no clear, quantitative means of relating one job to another. The PAQ, however, describes jobs in terms of human behavioral processes common to most jobs. The PAQ ratings are scored to produce 32 specific and 13 overall job dimensions, or characteristics derived from principal components analyses (Mecham, McCormick, & Jeanneret, 1977). This feature of the PAQ makes it a useful job analysis technique when the intention is to create and use job dimension scores as correlates of other variables.

There is evidence that characteristics derived from job analysis are related to characteristics reported by job incumbents. For instance, Dunham (1977) demonstrated that PAQ job evaluation points correlated positively with job scope and with ability requirements. In his study, however, each incumbent completed a PAQ on his or her own position. Consequently, common methods may have influenced the obtained relationships between the PAQ scores and the reported job characteristics.

Using an occupational classification technique, Rousseau (1982) found that the extent to which jobs required dealing with data and people positively correlated with averaged incumbent perceptions of autonomy, skill variety, and task significance.

Perceptions of task significance were also weakly and negatively correlated with dealing with things. These relationships were found by aggregating perceived characteristics across incumbents within job categories. Consequently, inferences to individual-level responses are not appropriate (Rousseau, 1987). In addition, the level of detail regarding work activity provided by the degree of involvement with data, people, and things would likely be insufficient for job redesign decisions. Rousseau's (1982) study, however, provides evidence that independently derived job characteristics can be related to different job characteristics reported by incumbents.

Summary

Taken together, studies suggest that incumbent-rated job characteristics are related to job characteristics (a) created through experimental manipulation, (b) assessed by observers, peers, or supervisors, and (c) derived from job or occupational analysis. No studies have been published, though, that relate job characteristics obtained through job analysis to incumbent-rated job characteristics after (a) ensuring response independence between job analysts and incumbents, and (b) measuring agreement among PAQ analysts. In sum, job analysis data may provide meaningful criteria for assessing the validity of incumbents' ratings of job characteristics.

Objectives and Hypothesis

The primary purpose of the present study was to examine relationships between job activities and incumbent-rated job characteristics. More specifically, the goals were to (a) obtain job analysis ratings from non-incumbents on a sample of jobs, (b) obtain ratings of job characteristics from incumbents in those jobs, and (c) examine relationships between characteristics produced from the job analysis ratings and those rated by incumbents. On the basis of literature cited above, it was hypothesized that job characteristics derived from job analysis (i.e., the 13 overall dimensions of the PAQ) would be related to perceived job characteristics rated by incumbents (i.e., the characteristics of Hackman & Oldham (1975) and Zaccaro & Stone [1988]). Table 1 lists the characteristics derived from analysts' ratings and incumbents' ratings.

Method

Subjects

Table 2 lists the organizations, job titles, and the number of job analysts and incumbents associated with each job. All participants were employed on a full-time basis.

Job analysts. Thirty-three supervisors and one incumbent completed PAQs for a total of 18 jobs. Of the 18 jobs, thirteen were analyzed by at least two PAQ respondents. Because of constraints on the availability

Table 1
Position Analysis Questionnaire (PAQ) Overall Dimensions
and Incumbent-Rated (Perceived) Characteristics

<u>PAQ Dimension^a:</u>	<u># Items</u>
1. Decision, communicating, and general responsibilities	77
2. Operating machines/equipment	60
3. Performing clerical/related activities	24
4. Performing technical/related activities	9
5. Performing service/related activities	10
6. Working regular day schedules versus other work schedules	8
7. Performing routine/repetitive activities	7
8. Being aware of work environment	37
9. Engaging in physical activities	18
10. Supervising/directing/estimating	11
11. Public/customer/related contacts	5
12. Working in an unpleasant/hazardous/demanding environment	17
13. Having a non-typical schedule/optional apparel style	6
<hr/>	
<u>Incumbent-Rated (Perceived) Characteristics:</u>	<u># Items</u>
1. Skill Variety	3
2. Task Significance	3
3. Task Identity	3
4. Autonomy	3
5. Feedback from the Job Itself	3
6. Dangerousness	3
7. Physical Demands	4
8. Intellectual Demands	3
9. Public Interaction and Service	3

^a Dimensions are listed as in the PAQ Users Manual (System II; Mecham, McCormick, & Jeanneret, 1977).

Table 2
Participants by Organization and Job Title

Organization	Job Title	Number of	
		Analysts	Workers
Food Process	Packaging Supervisor	2	2
Air National Guard	Materiel Facilities Supervisor	2	3
	Avionics Technician: ^a Electronic Warfare Systems	1	5
	Avionics Technician: ^a Communication & Navigation	1	3
	Avionics Technician: ^a Weapons Control	1	4
	Aircraft Armament Systems Technician	2	11
	Jet Engine Technician	2	5
	Tactical Aircraft Maintenance Technician	4	19
	ROTC Instructor	3	13
United States Air Force	Recruiter	2	20
	Inventory Management: Demand Processing	2	7
	Inventory Management: ^b Mission Capability	1	3
	Munitions Operations ^b Specialist	1	2
	Development Engineer: Electronics	2	12
	Development Engineer: Aeronautical	2	12
	Traffic Safety Officer	2	10
	Criminal Investigator	2	23
County Sheriff	Patrol Officer	2	69
Totals: 4		18	34
		34	223

^aCombined into a single job to test reliability and hypothesis.

^bExcluded from reliability analyses but included in hypothesis testing.

of respondents, only a single analysis could be obtained for each of the remaining five jobs. The return rate for the PAQ questionnaires was 100%. Of 34 analysts, eight were civilian, thirteen were active duty military, and thirteen were Air National Guard. Of the 25 who reported their age, the mean was 41 years ($SD = 5.91$; range = 24-50). Thirty analysts were male, four did not report their gender. Of the 23 who reported their level of educational attainment, seven were high school graduates, six had some college, and 10 were college graduates. Mean education was 14 years. The mean length of association with the rated job, on a scale from 1 (six months or less) to 5 (five years or more), was 4.43 ($SD = .84$; $n = 28$), or at least two years but less than five years. The range of association was from at least six months to more than five years. The degree to which each analyst felt familiar with the rated job was measured on a scale from 1 (not familiar at all) to 5 (extremely familiar). The mean familiarity was 4.64 (quite familiar; $SD = .56$, $n = 28$).

Incumbents. Of 270 distributed questionnaires, 226 incumbents returned data. Of these, three were eliminated because they were completed in an obviously invalid manner (e.g., marking all "1's" or all "4's" throughout the scales). The remaining 223 cases represented a return rate of 83%. Within each job category, the number of incumbents ranged from two to

69. Of the 223 participants, 104 (46.6%) were civilian, 66 (29.6%) were active duty military, and 53 (23.8%) were full-time members of the Ohio Air National Guard. Approximately 93% of the respondents were male. Of those reporting their ages, the mean was 34.3 years ($SD = 7.6$; range = 20 - 60; $n = 217$), mean job tenure was seven years and three months, and mean organizational tenure was 10 years and 3 months. The range of tenure for both job and organization was 11 months to 28 years. Approximately 75% had some degree of post high school education.

Measures

Position Analysis Questionnaire (PAQ). The PAQ (Form B; McCormick et al., 1969) is a 194-item instrument which can be used as a written questionnaire or structured interview to elicit the typical activities and human behaviors required of any position or job. The PAQ items are arranged in terms of six divisions, viz., Information Input, Mental Processes, Work Output, Relationships with Other Persons, Job Context, and Other Job Characteristics. As a result of a principal components analysis of the data on some 2200 jobs, McCormick and his colleagues found 13 components based on 190 of the 194 items or job elements (see Table 1). (There are four fill-in type items that are not included in the 13 dimensions.) The present study used only items which loaded $\geq .30$ on the 13 overall dimensions as

published in the PAQ Users Manual (Mecham et al., 1977). This reduced the total number of PAQ items used in the present research to 184. In the present study, an analyst first read instructions for completing the PAQ and answered three items (Appendix B). These items asked respondents for their job title, how long they have been associated with the rated job, and how familiar they are with the rated job. PAQ respondents were also asked to provide age, sex, and educational level on an optical-scan answer sheet used to record the PAQ responses. The PAQ is a copyrighted product and is available from the University Bookstore, 360 West State Street, West Lafayette, Indiana 47906.

Job Response Survey. A questionnaire was compiled (the Job Response Survey, Appendix C) to measure incumbents' ratings of the five core job characteristics of Hackman and Oldham (1975) and job characteristics identified by Zaccaro and Stone (1988; i.e., intellectual demands, public interaction and service, dangerousness, and physical demands). Items were also included to obtain respondent and job identifying information. Items measuring public interaction and service were changed slightly to suit the military job samples. Appendix A lists the items that measure each of the incumbent-rated characteristics.

The five core job characteristics (skill variety, task identity, task significance, autonomy, and feedback from the job itself) were measured with 15 items from Hackman and Oldham's (1974) Job Diagnostic Survey. Instructions and formats were taken directly from this instrument. The instructions asked incumbents to describe their jobs as objectively as possible. Scores on these five job characteristics were obtained from items in two different formats. In the first, a single item was provided for each job characteristic. Each item was accompanied by a seven-point graphic rating scale with verbally descriptive anchors for three levels of each characteristics (i.e., "Very Little", "Moderate", or "Very Much"). In the second format, two items were provided for each characteristic, one phrased in positive terms, the other in reversed form. A seven-point scale from "Very Inaccurate" through "Uncertain" to "Very Accurate" was employed.

The internal consistency reliability estimates (coefficient alpha; Cronbach, 1951) for each core job characteristic were reported by Hackman and Oldham (1974, 1975) on a sample of 658 employees working on 62 different jobs in seven organizations: skill variety, $\alpha = .71$; task identity, $\alpha = .59$; task significance, $\alpha = .66$; autonomy, $\alpha = .66$; and feedback from the job itself, $\alpha = .71$. The Zaccaro and Stone characteristics were measured on seven-point summated-type scales on which

respondents indicated their degree of agreement with statements describing the job.

Procedures

Sampling. The researcher contacted approximately 14 organizations from listings of business and industry provided by the Toledo area and Bowling Green Chambers of Commerce. In addition, military and law enforcement organizations were contacted. Preference was given to larger businesses (approximately 100 or more employees) because of the greater likelihood that these organizations would have standardized personnel classification systems. Of the organizations contacted, four consented to participate in this study. Any organization electing to participate was included if at least two incumbents and one PAQ analyst were initially available. In contacting a prospective organization, the researcher provided a written description of the study and the survey requirements. In each participating organization, the researcher interviewed a representative familiar with its personnel structure. In most cases, this was the personnel director. The two major purposes of this interview were to (a) identify, in the opinions of the researcher and the organization representative, jobs whose incumbents performed a uniform set of job activities, and (b) identify qualified job analysts. Jobs were selected so as to minimize within-job variability in job performance

requirements and activities. (A check on this operation was included in the incumbent questionnaire.) Prior research had indicated that PAQ respondents ought to possess some college-level reading ability (Ash & Edgell, 1975). Consequently, an attempt was made to identify analysts with both high levels of education and familiarity with the job. Once a job category was identified, a procedure was developed within each organization for distribution of the two types of questionnaires. In all cases, the questionnaires were distributed by supervisors and returned to them. Questionnaires were completed by volunteer analysts and incumbents either on their own time or company time and returned in sealed envelopes. For all jobs except two, all incumbents within a job category were targeted in the survey. For two jobs (electronics engineer and aeronautical engineer), a random sample of incumbents was surveyed.

Overview of Analyses

Treatment of missing data. There were no missing data on the PAQ items. On the Job Response Survey, however, respondents failed to respond to a total of 18 items on scales of interest to this study (excluding demographic items). Seven missing responses were found among the job characteristics items measuring intellectual demands, dangerousness, public interaction/service, and physical demands. For these

scales, the mean of scores on items answered by an incumbent were assigned to the missing item.

PAQ dimension scores. Scores for the 13 dimensions listed in Table 1 were created by summing the scores on the job elements (items) that loaded $\geq .30$ on the respective dimensions in the original principal components analysis. Each PAQ job element score was assigned the algebraic sign of its loading on the respective component. The resulting dimension score was then weighted by the number of items contributing to it (see Table 1). Research has shown that such unit-weighted component scores correlate very highly with scores created through conventional factor score regression procedures (e.g., Dawes & Corrigan, 1974; Trites & Sells, 1955). Finally, each of the 13 dimension scores was standardized across the 34 analyses to zero mean and unit variance in order to allow meaningful comparisons among analyses.

Reliability. The interrater reliability of the PAQ analyses was examined in two ways. First, for each job analyzed by two or more analysts, an average pairwise correlation (using Fisher's z transformation) and two intraclass correlations (Ebel, 1951; Shrout & Fleiss, 1979) were calculated using the 184 items in order to compare reliabilities with those reported in the literature. Second, the same statistics were computed using the standardized 13 overall dimensions because

these were used in subsequent hypothesis testing. The intraclass correlations were calculated for the item and dimension main effects using both one-way (items or dimensions) and two-way (Analyst x Item; Analyst x Dimension) analyses of variance for each job. The intraclass coefficients were computed using the following formula, from Ebel (1951, p. 410):

$$(\text{MS}_{\text{item (or dimension)}} - \text{MS}_{\text{error}}) / \text{MS}_{\text{item (or dimension)}}$$

This formula gives the reliability of averaged ratings. It should be noted that the one-way analysis of variance relegated the between-rater variance to the error term (producing a conservative reliability estimate); whereas the two-way analysis excluded between-rater variance from the error term. Following reliability analyses, the overall dimension scores were averaged within each job category.

The reliabilities of the perceived job characteristics scales were assessed with coefficient alpha (Cronbach, 1951).

Discriminant validity. The degree to which the PAQ ratings discriminated one job from another was examined by computing the intercorrelations of averaged PAQ dimension scores for 16 jobs. In addition, a Job x Dimension analysis of variance was performed on the 14

jobs having at least two analysts. The strength of the Job x Dimension interaction was evaluated as an indicator of discriminant validity.

Hypothesis testing. The level of analysis in the present study was the individual job incumbent. To study relationships between the two types of job characteristics, the PAQ overall dimension scores for a given job were assigned to all incumbents within that job. As a result, all incumbents employed in the same job have identical PAQ overall dimension scores. The rationale for this cross-level design was given by Rousseau (1987) and employed in Rousseau (1978) and Sutton and Rousseau (1979). In such a design, scores created by a higher level of measurement (i.e., PAQ job dimension scores) are disaggregated, or assigned to individuals. This procedure prevents the biases which would evolve if individual-level measures were aggregated to the job level. The bias would result from inferring individual-level differences from global-level analysis. The assignment of the PAQ scores to incumbents, however, may violate the assumption of independence among the individual scores on the PAQ dimensions. Because independence is assumed in the calculation of degrees of freedom, significance tests were interpreted with caution in the cross-level analyses that are described below.

It was hypothesized that the 13 PAQ job characteristics were related to the incumbent-rated job characteristics. Three analytical steps were employed to address this hypothesis. First, the Pearson product-moment correlations among the PAQ overall dimensions and perceived job characteristics were examined and a composite of six incumbent-rated characteristics (i.e., job complexity) was created. The six variables included in this composite were the five core characteristics and intellectual demands. Second, canonical correlation with redundancy analysis (Cooley & Lohnes, 1971; Stewart & Love, 1968) and other indicators was used to test the hypothesis. In this analysis, 13 overall dimensions were related to four perceived characteristics (job complexity, public interaction, physical demands, and dangerousness), yielding four pairs of canonical variates. Each pair of variates was composed of one linear composite of PAQ dimensions and one linear composite of incumbent-rated characteristics. Third, the 16 jobs were ranked on the pairs of canonical variate scores and the pairs of ranks were examined with Spearman rank-order correlations. These correlations indicated how meaningful the canonical solution was in terms of the original job categories.

Results

Job Analysis Ratings

Suitability of PAQ for the sampled jobs. Recent studies suggested that certain jobs are not suitable for analysis with the Position Analysis Questionnaire (e.g., DeNisi, Cornelius, & Blencoe, 1987). An index of suitability is the number of PAQ items marked "Does Not Apply" (DNA). Harvey and Hayes (1986) found, in a sample of 90 municipal jobs, an average DNA rate of 51% (mean number of DNA responses = 100, SD = 21). DeNisi et al. (1987), in a sample of 24 jobs, found a range of DNA responses from 5 to 63. In the present study, the mean DNA response rate across the 34 analyses was 28% (mean number of DNA responses = 51; SD = 33.5; range = 9-122). Most DNA responses were associated with the white collar jobs of recruiter, development engineer, inventory management, and packaging supervisor. The jobs with the lowest number of DNA responses were patrol officer and the various aircraft-related jobs. This is generally consistent with the DeNisi et al. (1987) and Cornelius, DeNisi, and Blencoe (1984) findings that the number of DNA's is negatively correlated with the degree to which jobs involve interaction with objects; and that the PAQ is better suited for blue-collar types of jobs. Overall, the PAQ appeared to be suitable for analyzing the jobs in the present sample.

Assessment of job categories. As mentioned above, of the 18 jobs in the total sample, five were analyzed by a single PAQ, preventing reliability estimation. If two or more of these five jobs could be combined, however, then multiple PAQs would result. There were two job areas in the sample that, because of the similarity in title, could be combined into single job categories if the PAQ ratings supported such a decision. The avionics technicians comprised three sub-specialties, and inventory management specialists had two sub-specialties (see Table 2). Correlations among PAQ ratings at the item and dimension levels are given in Table 3. Inspection of the correlations among PAQ's 10, 11, and 12 in Table 3 suggested that the three avionics jobs could be combined. The inventory management jobs (i.e., PAQ's 21, 22, and 24), however, appeared to be more distinct. By combining the avionics jobs, the number of total jobs became 16 rather than 18, 14 of which have at least two PAQ analyses and were analyzed in terms of reliability.

Reliability of PAQ analyses. The 14 jobs having multiple PAQ analyses and their interrater reliability estimates are listed in Table 4. Median pairwise correlations across items are typically reported in the literature. The present reliability data compared well with previous research. For example, Smith and Hakel (1979) found an average median pairwise coefficient of

Table 3

Correlations Between PAQ Ratings at the Dimension-Level (Lower) and Item-Level (Upper)

PAQ No. ^a	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	-	83	39	41	40	38	45	37	49	43	39	36	33	27	18	36	54	35	38	26	40	49	49	31
2	96	-	48	49	45	41	51	36	52	50	44	44	32	33	22	38	57	41	44	31	48	56	50	31
3	07	00	-	88	84	64	63	34	39	36	43	42	43	45	28	36	54	40	44	36	42	57	50	48
4	30	21	84	-	86	68	62	30	35	38	45	42	45	44	28	37	50	39	42	35	43	60	53	50
5	-26	-26	80	74	-	63	65	31	37	35	43	46	45	39	31	37	53	39	42	41	47	61	55	46
6	29	39	02	29	00	-	72	24	49	19	30	24	35	39	22	24	41	26	32	15	40	62	56	49
7	29	47	13	23	12	81	-	32	58	33	44	41	37	40	25	36	49	35	36	31	53	67	66	54
8	64	54	-33	-05	-52	-09	-32	-	46	32	44	45	39	35	23	28	51	42	34	35	28	35	42	36
9	69	62	-22	17	-35	43	12	74	-	28	37	27	26	40	23	34	49	37	36	33	39	56	60	42
10	14	-01	-12	-21	-33	-72	-74	45	-13	-	62	71	46	45	50	56	55	51	49	47	33	47	34	44
11	-49	-60	-08	-14	-01	-56	-55	-07	-39	49	-	72	54	49	44	58	65	62	55	49	51	45	37	
12	-57	-63	05	-21	04	-62	-43	-26	-71	48	81	-	56	55	50	62	59	62	54	60	38	51	44	35
13	-30	-43	15	-01	15	-56	-79	12	-26	60	39	29	-	62	41	47	56	55	52	52	38	43	39	29
14	-73	-77	-26	-37	04	-66	-67	-15	-38	22	62	49	45	-	52	45	47	60	45	55	37	47	46	28
15	-59	-65	-38	-46	-25	-29	-58	03	-02	08	34	21	42	64	-	59	38	55	46	55	41	39	32	19
16	-47	-55	-14	-43	-14	-63	-60	-21	-41	47	71	54	54	56	56	-	56	53	53	55	39	46	35	23
17	14	09	-32	-28	-22	-55	-57	44	05	55	-11	-03	30	29	06	-06	-	58	58	55	46	58	51	43
18	-37	-40	-01	-22	-03	-40	-30	-10	-10	01	45	36	09	49	63	61	-27	-	52	61	46	48	40	20
19	-08	-24	01	-02	10	-80	-82	26	-01	59	45	22	55	63	26	49	59	27	-	52	31	37	38	30
20	-61	-70	-33	-48	-17	-70	-83	05	-35	47	49	54	54	77	74	53	54	34	55	-	44	42	40	23
21	09	21	21	11	17	37	49	-21	13	-55	-31	-35	-22	-29	07	02	-62	45	-42	-47	-	76	45	32
22	-08	15	05	-12	16	42	71	-59	-33	-53	-44	-23	-36	-36	-38	-18	-41	-20	-63	-55	51	-	62	51
23	02	06	-52	-16	-35	50	30	19	37	-35	-20	-21	-53	-10	-01	-57	07	-39	-39	-03	-37	-07	-	57
24	71	69	-14	16	-35	61	39	51	64	-05	-54	-51	-36	-80	-40	-64	02	-62	-49	-48	-11	03	53	-
25	55	58	38	59	33	40	60	-02	17	-23	-36	-29	-55	-58	-92	-69	-07	-60	-24	-73	-14	24	23	45
26	57	58	56	45	25	19	48	-15	01	-05	-43	-23	-36	-68	-83	-34	-15	-36	-19	-69	09	38	-25	32
27	32	42	25	24	06	53	76	-30	-13	-27	-34	-07	-58	-70	-80	-49	-39	-54	-67	-72	02	59	22	47
28	39	45	-07	15	-04	41	44	05	15	-13	-49	-36	-44	-44	-70	-71	27	-89	-27	-41	-48	24	57	59
29	-61	-52	44	07	58	-27	12	-84	-89	-19	21	50	02	27	-16	21	-21	11	-03	10	03	41	-36	-66
30	-04	11	38	19	45	16	57	-66	-53	-35	-25	-01	-34	-25	-70	-23	-21	-38	-29	-47	10	69	-17	-16
31	04	12	-21	-15	-34	47	54	-21	-10	-19	17	12	-44	-26	-33	-04	-55	-22	-55	-43	02	34	29	17
32	-31	-19	-19	-16	-10	35	47	-46	-33	-32	33	26	-34	05	-18	08	-59	-05	-45	-28	08	41	24	-17
33	-53	-47	-28	-38	-10	20	-03	-26	-04	-44	-11	-12	08	23	77	23	-24	40	-28	35	43	13	10	-19
34	-46	-33	-17	-52	-03	-13	-06	-41	-39	-20	-22	-04	23	21	49	35	00	30	-14	31	45	45	-33	-38

(table continues)

Table 3 (cont'd)

Correlations Between PAQ Ratings at the Dimension-Level (Lower) and Item-Level (Upper)

PAQ No.	25	26	27	28	29	30	31	32	33	34
1	52	55	51	55	43	48	44	45	30	40
2	51	55	52	55	45	51	50	50	38	51
3	66	69	68	69	67	68	66	66	55	57
4	68	70	68	70	69	73	66	68	55	58
5	66	66	66	68	71	72	66	66	60	60
6	61	54	65	67	57	61	65	61	44	45
7	66	65	68	74	60	67	70	67	60	58
8	25	30	32	31	24	26	33	29	24	32
9	55	52	49	55	34	41	49	43	38	39
10	38	41	43	45	32	39	40	38	29	43
11	41	44	42	48	42	38	50	50	47	51
12	35	41	42	44	43	42	41	40	40	49
13	32	43	35	40	47	46	39	42	33	46
14	40	40	39	43	40	43	44	41	44	38
15	26	29	30	34	30	25	37	37	40	39
16	37	40	40	44	41	42	45	45	44	50
17	53	57	50	59	47	47	56	56	47	61
18	35	43	32	39	36	31	45	44	54	50
19	39	39	41	46	39	38	39	33	34	40
20	28	36	35	37	42	36	34	35	48	53
21	44	50	46	49	49	46	56	56	58	55
22	65	68	65	68	64	65	72	72	58	65
23	61	60	67	70	59	63	63	61	53	56
24	62	54	65	64	42	52	47	41	25	41
25	-	84	75	81	56	66	63	58	43	46
26	75	-	77	83	60	68	62	62	46	57
27	74	74	-	87	63	69	67	60	41	53
28	76	47	65	-	64	70	72	69	49	58
29	06	20	24	-07	-	83	70	71	60	73
30	57	62	67	44	74	-	69	69	55	65
31	25	14	63	27	08	34	-	92	69	70
32	13	-06	44	12	34	42	90	-	69	74
33	-73	-61	-44	-51	-01	-33	-16	-02	-	71
34	-65	-29	-29	-43	30	08	-26	-11	74	-

(table continues)

Table 3 (cont'd)

Correlations Between PAQ Ratings at the Dimension-Level
(Lower) and Item-Level (Upper)

Note. Bold numbers represent within-job correlations.
Decimals omitted. Upper diagonal (items) $n = 184$; lower
(dimensions) $n = 13$;

^aPAQ numbers indicate the following jobs:

1,2	Packaging Supervisor	17-20	Tactical Aircraft Maintenance Technician
3-5	ROTC Instructor	21-22	Inventory Management: Demand Processing
6,7	Recruiter	23	Munitions Operations Specialist
8,9	Materiel Facilities Supervisor	24	Inventory Management: Mission Capability
10	Avionics Technician: Warfare Systems	25,26	Development Engineer: Electronics
11	Avionics Technician: Communication & Navigation	27,28	Development Engineer: Aeronautics
12	Avionics Technician: Weapons Control	29,30	Traffic Safety Officer
13,14	Aircraft Armament Systems Technician	31,32	Criminal Investigator
15,16	Jet Engine Mechanic	33,34	Patrol Officer

Table 4

Interrater Reliability Estimates of PAQ Ratings

Job	Items				Dimensions		
	DNA ^a	Mdn r	IC ₁ ^b	IC ₂ ^c	Mdn r	IC ₁ ^b	IC ₂ ^c
1 Packaging Supervisor	107	.83	.89	.90	.96	.96	.98
2 ROTC Instructor	22	.86	.94	.95	.80	.86	.92
3 Recruiter	75	.72	.84	.84	.81	.82	.90
4 Materiel Facilities Supervisor	55	.46	.63	.63	.74	.86	.85
5 Avionics Technician	16	.71	.84	.87	.49	.71	.82
6 Aircraft Armament Systems Technician	9	.62	.71	.74	.45	.61	.62
7 Jet Engine Mechanic	10	.59	.68	.74	.56	.46	.63
8 Tactical Aircraft Mechanic	9	.57	.81	.83	.45	.67	.68
9 Inventory Management Demand Processing	34	.76	.86	.86	.51	.55	.65
10 Munitions operations	-	-	-	-	-	-	-
11 Inventory Management: Mission Capability	-	-	-	-	-	-	-
12 Development Engineer: Electronics	16	.84	.87	.90	.75	.55	.79
13 Development Engineer: Aeronautical	60	.87	.93	.93	.65	.77	.80
14 Traffic Safety Officer	30	.83	.87	.91	.74	.60	.83
15 Criminal Investigator	33	.92	.95	.96	.90	.92	.95
16 Patrol Officer	9	.71	.82	.83	.74	.85	.85
Median:	27.5	.75	.85	.87	.74	.75	.82

^anumber of PAQ items rated by all analysts "Does Not Apply"

^bIntraclass coefficient derived from one-way analysis of variance (i.e., between-rater variance contained in error term)

^cIntraclass coefficient derived from two-way analysis of variance (i.e., between-rater variance excluded from error term)

.63 for 25 jobs. Cornelius, Carron, and Collins (1979) reported a median pairwise estimate across items of .59. The original research on the PAQ (McCormick et al., 1972) involved specially trained analysts, and the average of all pairwise coefficients across items was .79. In general, pairwise coefficients for the PAQ range from .68 to .84 for job content experts (trained jobs analysts, incumbents, and supervisors; Harvey & Hayes, 1986).

Table 4 also lists the number of DNA items agreed upon by all analysts for a given job. Harvey and Hayes (1986) and Mecham et al. (1977) warned that DNA agreements may inflate reliability estimates. Using the Monte Carlo results of Harvey and Hayes (1986), all median correlations of PAQ items in the present data except one (job 4: materiel facilities supervisor) exceeded the random chance agreement levels that are possible given the levels of DNA agreement.

An alternate estimator of rating reliability is the intraclass correlation coefficient. The advantage of the intraclass coefficient is that the researcher can decide if between-rater variance should be included in the error term. As Ebel (1951) pointed out, the decision to include between-rater differences in the reliability analysis depends on how the data are to be used. In the present analysis, appropriate reliability estimates utilize dimension scores, ignoring between-rater

variance. This is because the overall dimensions were averaged within jobs prior to assignment to job categories. In Table 4, the column headed IC_2 at the dimension-level contains these intraclass coefficients. Although several of these coefficients were somewhat low (.62 to .68), all the median coefficients compared well with those reported in the published literature.

Discriminant validity of PAQ dimension scores.

Table 5 contains the intercorrelations among the 16 jobs in terms of the 13 overall dimensions. For jobs having multiple PAQ analyses, the overall dimension scores from each analysis were averaged prior to correlation. The entries in the matrix in Table 5 suggested that, on the whole, the jobs in the sample differed only moderately in the profiles of the 13 overall dimensions. The diagonal of the matrix contains the median of the squared Pearson correlation between each job's profile of dimensions with all other jobs. As can be seen, these indices of shared variance ranged from nearly zero to 38%. A second method of assessing differentiation among the job analyses was by analysis of variance of the dimension scores. This was a 13 (Dimensions) x 14 (Jobs) ANOVA with 416 (32 PAQ analyses x 13 Dimensions) observations. That is, observations were scores on the PAQ dimensions, to be partitioned into variance due to the job, dimensions, and the Job x Dimension interaction. If jobs differed across dimension scores,

Table 5
Correlations and Shared Variance of Dimension Scores Between Jobs

Job	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Packaging Supervisor																
2. ROTC Instructor																
3. Recruiter																
4. Materiel Facilities Supervisor																
5. Avionics Technician																
6. Aircraft Armament Systems Technician																
7. Jet Engine Mechanic																
8. Tactical Aircraft Maintenance Technician																
9. Inventory Management: Demand Processing																
10. Munitions Operations																
11. Inventory Management: Mission Capability																
12. Development Engineer: Electronics																
13. Development Engineer: Aeronautical																
14. Traffic Safety Officer																
15. Criminal Investigator																
16. Patrol Officer																

Note. $n = 13$. Decimals omitted. Boldface (diagonal) entries represent the median proportion of variance shared by each job analysis with all others.

then the effect size of the job main effect should be significant. Also, the dimension scores should differ as a function of the job, resulting in a significant Job x Dimension interaction. Results of this analysis are in Table 6. Both the job and the Job x Dimension interaction terms were significant. The absence of a significant dimension main effect added further support to the importance of the job category in interpreting the level of a dimension score.

Job Incumbent Ratings

Descriptive and correlational statistics. Table 7 presents the coefficient alpha reliabilities and correlations among the incumbent-rated variables. Table 8 includes descriptive statistics for the incumbent ratings. The internal consistencies listed in Table 7 were all within expected ranges except for intellectual demands ($\alpha = .40$). The low reliability of this scale suggested cautious interpretation of relationships with other variables in analyses below.

Relationships Between PAQ Dimensions and Incumbent-Rated Characteristics

Assignment of PAQ dimension scores. In order to test the hypothesis that the PAQ and the incumbent-perceived characteristics are related, the relevant PAQ overall dimension scores (Table 9) were assigned to each incumbent. This procedure presumed that workers in each

Table 6

Analysis of Variance for Dimension Scores

Source	df	MS	F	ω^2
Job	13	8.71	25.02***	.28
Dimension	12	.10	.28	.00
Job x Dimension	156	1.25	3.60***	.36
Error	234	.35		
Total	415			

***p < .0001.

Table 7

Alpha Reliability Estimates and Correlations for Perceived Job Characteristics

Scale	1	2	3	4	5	6	7	8	9	10
1. Autonomy	63									
2. Task Identity	33	65								
3. Skill Variety	48	27	62							
4. Task Significance	28	28	40	72						
5. Feedback from the Job Itself	30	41	31	44	76					
6. Intellectual Demands	29	05	44	29	20	40				
7. Job Complexity ^a	68	63	73	67	68	55	82			
8. Public Interaction	00	-24	-01	13	-02	23	-01	75		
9. Physical Demands	03	12	26	21	13	05	20	-22	84	
10. Dangerousness	05	03	35	33	15	26	29	04	76	90

Note. *N* = 223. Decimals omitted. Boldface (diagonal) entries are coefficient alpha estimates of internal consistency reliability. Correlations at or above .13 are significant.

^aComposite of autonomy, task identity, skill variety, task significance, feedback from job, and intellectual demands.

Table 8

Descriptive Statistics for Jobs: Incumbent-Rated Variables

Job	n		JT	OT	Age	S	AUT	TI	SV	TS	FJI	ID	JC	PI	PD	DR
1. Packaging Supervisor	2	<u>M</u>	2.8	.	25.5	.	6.3	4.5	4.8	4.3	5.0	4.3	4.9	2.7	2.9	2.5
		<u>SD</u>	3.5		2.1	.	.47	1.7	.71	.47	0.0	2.8	.08	2.4	1.6	.24
2. ROTC Instructor	13	<u>M</u>	1.5	10.0	34.5	3.9	5.7	5.2	4.2	6.0	4.6	5.0	5.1	4.4	2.1	2.1
		<u>SD</u>	.95	5.7	4.6	1.2	.94	1.2	1.9	1.0	1.7	.77	1.0	1.6	.95	.69
3. Recruiter	20	<u>M</u>	4.5	10.3	31.3	4.4	5.2	4.5	5.2	6.4	5.4	5.9	5.4	6.4	1.6	3.8
		<u>SD</u>	3.7	5.1	5.5	.65	1.5	2.0	.91	.59	1.1	.82	.63	.82	.64	1.4
4. Materiel Facilities Supervisor	3	<u>M</u>	9.5	22.7	41.0	4.3	6.4	5.8	5.2	6.6	5.9	4.6	5.7	3.8	4.7	5.4
		<u>SD</u>	10.2	4.0	4.0	1.2	.69	1.6	1.5	.51	1.2	.51	.61	1.7	1.2	.69
5. Avionics Technician	12	<u>M</u>	7.4	10.5	33.4	4.3	5.7	6.2	6.2	6.0	6.0	5.6	6.0	2.3	4.3	4.9
		<u>SD</u>	3.8	5.5	6.8	.78	.74	.77	.54	1.0	.92	1.1	.69	.94	.86	1.2
6. Aircraft Armament Systems Technician	11	<u>M</u>	11.8	11.8	32.5	4.6	4.5	5.4	5.2	6.0	4.8	4.6	5.1	3.1	5.3	6.2
		<u>SD</u>	5.7	6.7	7.1	.69	.98	.68	.69	.60	.67	1.0	.48	1.2	.55	.43
7. Jet Engine Mechanic	5	<u>M</u>	17.5	17.6	38.6	5.0	5.3	5.4	5.3	5.9	5.3	4.7	5.3	2.8	5.6	5.7
		<u>SD</u>	6.5	6.4	8.9	0.0	.64	.93	.41	.84	.71	1.5	.50	1.4	.58	1.0
8. Tactical Aircraft Maintenance Technician	19	<u>M</u>	15.0	17.3	39.3	4.5	4.8	5.3	5.3	6.3	4.9	5.1	5.3	3.6	5.5	6.1
		<u>SD</u>	8.1	6.1	6.8	.84	.98	.92	.79	.74	1.2	.72	.55	1.3	.80	.89
9. Inventory Management: Demand Processing	7	<u>M</u>	3.5	3.5	23.0	3.7	3.5	4.4	2.5	6.4	5.0	4.5	4.4	6.0	1.7	1.3
		<u>SD</u>	2.4	2.5	3.1	1.1	.77	1.6	.84	.71	1.5	1.1	.60	.77	1.0	.49
10. Munitions Operations	2	<u>M</u>	2.0	2.5	21.0	3.0	2.8	5.0	3.0	4.7	4.2	4.8	4.1	5.7	1.5	4.2
		<u>SD</u>	.71	0.0	1.4	0.0	.71	.94	1.9	0.0	.24	.24	.04	.47	.71	.24
11. Inventory Management: Mission Capability	3	<u>M</u>	3.3	3.8	23.3	4.0	4.9	6.0	4.4	6.6	6.0	3.7	5.3	5.3	1.1	1.0
		<u>SD</u>	1.0	1.2	1.2	1.7	.69	.88	.69	.38	.88	.58	.28	1.9	.14	.00
12. Development Engineer: Electronics	12	<u>M</u>	5.0	6.3	30.8	3.4	5.5	3.9	5.2	5.0	4.0	5.9	5.0	4.9	1.3	1.8
		<u>SD</u>	2.2	2.8	5.3	1.0	1.1	1.1	1.1	1.2	1.4	.71	.61	1.7	.49	.87
13. Development Engineer: Aeronautical	12	<u>M</u>	3.5	4.5	26.5	2.5	5.2	4.1	4.4	4.3	4.2	5.3	4.6	5.2	1.4	1.3
		<u>SD</u>	1.7	1.6	2.0	1.3	1.2	1.8	1.0	1.6	1.2	1.3	1.0	1.1	.50	.37
14. Traffic Safety Officer	10	<u>M</u>	5.7	10.7	34.6	3.5	6.1	5.7	5.5	6.5	5.1	6.2	5.8	5.8	4.0	5.9
		<u>SD</u>	3.9	3.3	4.8	1.6	.71	1.2	.74	.48	1.2	.77	.74	.71	1.3	1.2

(table continues)

Table 8 (continued)

Descriptive Statistics for Jobs: Incumbent-Rated Variables

Job	n	JT	OT	Age	S	AUT	TI	SV	TS	FJI	ID	JC	PI	PD	DR	
15. Criminal Investigator	23	<u>M</u>	7.5	15.0	41.4	4.3	6.1	5.2	5.4	6.1	5.3	5.9	5.7	5.4	3.7	6.1
		<u>SD</u>	5.6	4.6	6.4	1.1	.88	1.1	.92	1.0	1.1	.86	.63	.71	.80	.91
16. Patrol Officer	69	<u>M</u>	7.4	8.5	35.6	4.4	5.2	4.1	5.1	6.1	4.8	5.6	5.2	5.9	4.5	6.3
		<u>SD</u>	5.7	5.2	7.3	.90	1.0	1.0	1.2	.92	1.1	1.0	.73	.75	.85	.97
Total Sample		<u>M</u>	212	216	217	214	223	223	223	223	223	223	223	223	223	223
		<u>M</u>	7.3	10.3	34.3	4.1	5.3	4.8	5.1	6.0	5.0	5.4	5.2	5.0	3.6	4.9
		<u>SD</u>	6.2	6.2	7.6	1.1	1.2	1.4	1.2	1.1	1.2	1.1	.77	1.6	1.7	2.1

Note. n = number of incumbents in job category; JT = job tenure in years; OT = organizational tenure in years; S = work similarity; AUT = autonomy; TI = task identity; SV = skill variety; TS = task significance; FJI = feedback from the job itself; ID = intellectual demands; JC = job complexity; PI = public interaction; PD = physical demands; DR = dangerousness.

Table 9

Descriptive Statistics for Jobs: PAQ Overall Dimension Scores

Job	PAQ Overall Dimensions												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Packaging Supervisor	-1.5	-1.1	-2.0	-1.6	-0.9	0.7	-0.2	-1.0	-0.9	0.3	-0.3	-1.2	-0.5
2. BOTC Instructor	0.7	-0.1	-0.2	0.5	1.5	-0.2	-0.7	0.0	-0.3	0.9	-0.4	-0.6	-0.5
3. Recruiter	-0.2	-1.2	-0.5	-1.6	-0.2	0.5	-1.1	-0.9	-1.2	-1.5	0.2	-1.3	-0.9
4. Materiel Facilities Supervisor	-1.7	-0.6	-1.0	-1.4	0.3	0.6	0.9	-0.5	0.4	0.2	-1.1	0.0	1.1
5. Avionics Technician	-0.6	0.9	-0.2	0.8	-0.8	-0.8	-0.8	0.2	0.5	0.1	-1.0	0.3	-1.0
6. Aircraft Armament Systems Technician	1.1	1.6	1.2	1.2	0.8	-1.4	0.6	1.3	2.1	1.6	-0.3	1.5	1.1
7. Jet Engine Mechanic	0.3	1.7	0.8	0.8	1.2	-1.5	1.1	1.3	1.4	-0.1	0.4	2.0	0.7
8. Tactical Aircraft Maintenance Technician	0.3	1.4	0.6	1.4	0.3	-1.2	1.9	1.2	1.1	1.3	-0.6	1.3	0.7
9. Inventory Management: Demand Processing	0.4	0.2	0.5	-0.4	1.1	-0.1	0.2	0.2	0.2	0.2	1.9	-0.1	-0.5
10. Munitions Operations	0.0	-0.6	1.4	-0.2	-0.9	1.3	0.8	-0.5	-0.4	-1.8	-1.2	-0.1	1.1
11. Inventory Management: Mission Capability	-1.9	-1.4	-1.6	-1.0	-1.2	1.1	-1.2	-1.7	-1.5	-1.3	-0.6	-1.3	1.1
12. Development Engineer: Electronics	0.2	-0.6	-0.6	0.1	-0.2	1.1	-0.5	-0.9	-0.9	0.9	-0.1	-0.6	-0.9
13. Development Engineer: Aeronautical	0.2	-0.8	-0.4	0.0	-1.4	0.9	-0.9	-1.1	-1.0	-0.2	-0.1	-0.8	-0.5
14. Traffic Safety Officer	1.5	-0.1	0.7	1.2	-0.1	-0.2	-0.4	0.6	-0.2	0.9	0.8	-0.1	-1.3

(table continues)

Table 9 (continued)

Descriptive Statistics for Jobs: PAQ Overall Dimension Scores

Job	PAQ Overall Dimensions												
	1	2	3	4	5	6	7	8	9	10	11	12	13
15. Criminal Investigator	0.2	-0.1	0.1	-0.5	-0.9	0.5	-1.1	0.1	0.3	-0.9	0.0	0.1	-1.3
16. Patrol Officer	1.0	0.8	1.4	0.7	1.6	-1.6	1.5	1.7	0.7	-0.5	2.4	1.0	1.5

Note. Dimension scores are standardized across jobs to zero mean and unit variance.

job performed similar activities under similar objective conditions. As indicated in the Method section, jobs included in the original sample were selected to maximize such similarity of worker-to-worker job activities within jobs. As a check on this manipulation, each incumbent rated his or her job on the homogeneity of the job activities across co-workers. The single five-point scale on the Job Response Survey asked: "How similar is your work to that of co-workers who have the same job title?" The response categories ranged from "Very Different" to "Very Similar". The overall mean ($n = 214$) was 4.2 ($SD = 1.1$; see Table 8). These ratings were negatively skewed, with "Very Similar" the median and modal response. Only 22 of the 214 incumbents responding to the similarity item indicated strong dissimilarity (i.e., "Very Different" or "Somewhat Different") among positions within jobs; and these cases were spread among 10 different jobs, representing a minority within any particular job. A check on the validity of the similarity ratings was performed as follows: The greater the mean similarity rating of work activities within a job, the lower the mean variability should be among the various job characteristics rated by the incumbents. This was found to be the case. The mean within-job variances of the nine incumbent-rated job characteristics were negatively correlated ($r(10) = -.57$, $p = .06$) with the mean within-job similarity

ratings across the 12 jobs containing at least five incumbents. This trend suggested that workers who, as a group, perceived their jobs as more similar in work activities also tended to exhibit less variability (i.e., more agreement with co-workers) on the various job characteristics. Thus, the high level of judged within-job work similarity and the relationship found between judged similarity and agreement in rated characteristics suggested that assigning job-level measurements to individual incumbents was justified.

Relationships with PAQ overall dimensions. Table 10 gives the correlations between the PAQ dimension scores and the incumbent-rated characteristics. Because of the overall number of variables involved in the present analysis (i.e., 22) compared to the sample size (i.e., 223), a reduction in the number of variables was desirable. Prior research has shown that a unit-weighted combination of the five core dimensions (i.e., job scope) often outperformed the motivating potential score as a predictor (Fried & Ferris, 1987). Research has also demonstrated the value of combining job scope and intellectual demands into a composite labeled job complexity (Stone & Gueutal, 1985). The correlations among these six variables and the internal consistency reliability of the job complexity composite in the present study suggested that they could be combined (see Table 7). As an additional check on the appropriateness

Table 10

Correlations Between PAQ Dimensions and Perceived Job Characteristics

PAQ Dimensions	Perceived Job Characteristics									
	AUT	TI	SV	TS	FJI	ID	JCOMP	PI	PD	DR
1. Decision, Communicating, General Responsibilities	-06	-19	-03	06	-20	14	-08	27	34	41
2. Operating Machines & Equipment	-13	08	13	14	-01	-11	03	-32	79	61
3. Performing Clerical/ Related Activities	-17	-14	02	14	-09	04	-06	16	62	65
4. Performing Technical/ Related Activities	-07	07	11	01	-11	-05	-01	-31	61	40
5. Performing Service/ Related Activities	-14	-20	-10	19	-10	-06	-12	16	39	34
6. Regular Day Schedule vs Other Work Schedule	11	06	-12	-20	00	04	-02	08	-73	-64
7. Performing Routine/ Repetitive Activities	-20	-16	02	12	-10	-08	-11	00	65	54
8. Being Aware of Work Environment	-08	-08	11	20	-03	01	02	01	76	72
9. Engaging in Physical Activities	-10	10	13	16	02	-12	05	-30	81	67
10. Supervising/Directing/ Estimating	-05	17	-02	-06	-13	-19	-06	-49	25	-07
11. Public/Customer/ Related Contacts	-08	-35	-07	11	-10	13	-11	51	23	36
12. Unpleasant/Hazardous/ Demanding Environment	-12	00	13	13	-03	-08	01	-20	81	69
13. Non-typical Work Schedule/ Optional Apparel	-21	-20	-03	07	-11	-14	-16	07	51	44

Note. N = 223. Decimals omitted. Correlations at or above |.13| are significant. AUT = autonomy; TI = task identity; SV = skill variety; FJI = feedback from the job itself; JCOMP = job complexity; PI = public interaction/service; PD = physical demands; DR = dangerousness.

of combining them, however, a principal components analysis was performed on the correlation matrix of the nine perceived job characteristics to determine if the six characteristics above formed a single composite. Three eigenvalues greater than one were obtained: 2.92, 1.56, and 1.39. (The eigenvalue for the fourth component was .90.) Table 11 indicates that, after Varimax rotation, the six variables formed a clear composite in the present data. Therefore, they were combined into a unit-weighted job complexity composite. Unit-weighting rather than differential weighting by the coefficients of the principal components analysis was used in order to keep the input variables as close to the original form as possible for comparison with prior research. Other composite variables could also have been formed (such as physical demands/dangerousness, or several of the PAQ dimensions; see Tables 7 and 12). Because a primary objective of the present study was to examine commonly used perceived and PAQ-derived characteristics, it was considered more important to retain as many of the original variables as feasible for the canonical correlation analysis.

A canonical correlation analysis was performed using the four perceived job characteristics (job complexity, public interaction, physical demands, and dangerousness) and the 13 PAQ dimensions. As depicted in

Table 11

Principal Components Analysis of Perceived Job Characteristics

Scale	Component Patterns					
	I	II	III	I, ^a	II, ^a	III, ^a
Autonomy	.58	.45	-.07	.73	-.08	-.09
Task Identity	.50	.29	-.58	.68	-.04	-.45
Task Significance	.69	.11	.14	.61	.29	.24
Skill Variety	.76	.09	.04	.67	.33	.15
Feedback from Job	.61	.28	-.19	.70	.07	-.06
Intellectual Demands	.53	.19	.53	.44	.17	.62
Public Interaction	-.04	.22	.81	-.08	-.13	.82
Physical Demands	.52	-.78	-.13	.07	.92	-.21
Dangerousness	.60	-.69	.21	.11	.92	.15
<hr/>						
<u>% Variance explained:</u>	<u>32.4</u>	<u>17.3</u>	<u>15.4</u>	<u>27.8</u>	<u>21.6</u>	<u>15.8</u>

Note. N = 223. Solution based on scale-level correlations.

^aLoadings after Varimax rotation.

Table 12

Correlations Between PAQ Overall Dimensions

PAQ Overall Dimensions	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Decision, Communicating, & General Responsibilities	-												
2. Operating Machines & Equipment	49	-											
3. Performing Clerical/ Related Activities	81	76	-										
4. Performing Technical/ Related Activities	60	83	66	-									
5. Performing Service/ Related Activities	63	57	73	46	-								
6. Regular Work Schedule vs. Other Schedule	-58	-88	-86	-71	-78	-							
7. Performing Routine/ Repetitive Activities	49	77	79	64	74	-84	-						
8. Being Aware of Work Environment	70	88	94	73	77	-95	86	-					
9. Engaging in Physical Activities	45	95	75	70	51	-81	70	85	-				
10. Supervising/Directing/ Estimating	21	44	05	65	14	-18	23	18	38	-			
11. Public/Customer/Related Contacts	65	28	71	19	71	-59	57	66	25	-33	-		
12. Working Unpleasant/ Hazardous/Demanding Environments	53	96	84	77	60	-88	84	92	95	30	42	-	
13. Non-typical Work Schedules/Optional Apparel	41	63	74	48	75	-78	89	76	59	04	61	73	-

Note. N = 223. Decimals omitted. Correlations at or above [.13] are significant.

Table 13, four canonical functions were obtained. The greatest characteristic root (i.e., the square of the canonical correlation between the first pair of canonical variates) was tested for significance with degrees of freedom equal to $g = \min(p, q)$, $m = (|p - q| - 1)/2$, and $n = (N - p - q - 2)/2$, where p = the number of variables in one set, q = the number of variables in the other set, and N = total sample, or 223 (Harris, 1985). The i th root was tested for statistical significance with degrees of freedom as above except that $g_i = \min(p - i + 1, q - i + 1)$. These tests indicated that the greatest characteristic root (.85) with $g = 4$, $m = 4$, $n = 102$ degrees of freedom was significant ($p < .0001$). The second root (.61) and third root (.26) were also significant at $p < .0001$ with $g = 3$ and $g = 2$, respectively. The fourth root (.05) was nonsignificant. These results indicated that three orthogonal linear composites (canonical variates) of the PAQ dimensions (denoted as PAQ1, PAQ2, and PAQ3) were significantly correlated with three corresponding canonical variates of the perceived (i.e., incumbent-rated) job characteristics (PJC1, PJC2, and PJC3). The squared canonical correlations, however, indicated the amount of variance explained in the pairs of canonical variates, not the original variables. In order to interpret the substantive nature of the variates in terms of the original variables and to assess their predictive

Table 13

Canonical Correlation Analysis of PAQ Overall Dimensions with Perceived Job Characteristics (PJC)

Canonical function	I	II	III
Canonical correlation	.92	.78	.51
Squared canonical correlation	.85***	.61***	.26***

PAQ Overall Dimensions:	PAQ1				PAQ2				PAQ3			
	r ^{2a}	r ^b	β^c	UI ^d	r ^{2a}	r ^b	β^c	UI ^d	r ^{2a}	r ^b	β^c	UI ^d
1. Decision, Communicating, General Responsibilities	.16	.40	-.51	.00	.20	.45	.03	.00	.14	-.38	-2.06	.02
2. Operating Machines & Equipment	.71	.84	-1.97	.02	.06	-.25	.12	.00	.15	-.39	-2.29	.00
3. Performing Clerical/Related Activities	.50	.71	.56	.00	.14	.38	1.13	.00	.20	-.45	3.0	.01
4. Performing Technical/Related Activities	.37	.61	-.64	.00	.08	-.29	-1.95	.01	.17	-.41	-2.52	.01
5. Performing Service/Related Activities	.15	.39	-.44	.01	.07	.26	-.49	.01	.30	-.55	-.57	.00
6. Working Regular Days vs Other Schedules	.62	-.79	-.92	.01	.00	-.06	.73	.00	.16	.40	-.91	.00
7. Performing Routine/Repetitive Activities	.45	.67	-.57	.00	.02	.13	-.50	.00	.41	-.64	-3.38	.02
8. Being Aware of Work Environment	.71	.84	2.27	.01	.04	.19	2.79	.01	.16	-.40	6.04	.02
9. Engaging in Physical Activities	.77	.88	-.74	.00	.04	-.19	-1.83	.00	.09	-.30	-5.07	.01
10. Supervising/Directing/Estimating	.03	.16	.55	.00	.45	-.67	.49	.00	.11	-.33	2.41	.01
11. Public/Customer/Related Contacts	.08	.28	-.72	.02	.50	.71	-.28	.00	.19	-.44	-1.74	.04
12. Unpleasant/Hazardous/Demanding Environment	.77	.88	1.89	.02	.00	-.06	.12	.00	.18	-.42	4.03	.02
13. Non-typical Work Schedule/Optional Apparel	.29	.54	-.26	.00	.04	.20	.35	.00	.44	-.66	-.19	.00
	(.37) ^e				(.08) ^e				(.06) ^e			
	PJC1				PJC2				PJC3			
Perceived Job Characteristics:	r ²	r	β	UI	r ²	r	β	UI	r ²	r	β	UI
Job Complexity	.05	.23	-.04	.00	.01	-.07	-.15	.01	.61	.78	.76	.14
Public Interaction	.04	-.21	-.13	.01	.85	.92	.80	.33	.01	-.11	-.37	.03
Physical Demands	.88	.94	.49	.07	.02	-.13	-.41	.04	.04	-.21	-1.04	.10
Dangerousness	.85	.92	.57	.10	.10	.32	.63	.09	.04	.20	.79	.06
	(.39) ^f				(.16) ^f				(.05) ^f			

*** p < .0001 (N = 223).

^asquared correlations between original variables and canonical variate (variance matrix)^bPearson correlations between original variables and canonical variate (structure matrix)^cstandardized regression coefficients used to compute variate scores from standardized input variables^dusefulness index: squared semi-partial correlation with the opposite variate^eredundancy coefficient for the proportion of standardized variance in PAQ dimensions accounted for by the opposite canonical variate of the perceived job characteristics (i.e., PJC1-PJC3)^fredundancy coefficient for the proportion of standardized variance in perceived job characteristics accounted for by the opposite canonical variate of the PAQ overall dimensions (i.e., PAQ1-3)

efficiency, five indicators were computed: canonical regression coefficients (Harris, 1985), structural coefficients (Meredith, 1964), variance matrix coefficients (Dunham & Kravetz, 1975), redundancy coefficients (Stewart & Love, 1968), and squared semi-partial correlations (Darlington, 1968) between each original variable and its opposite variate.

Meredith (1964) pointed out that when the variables within each set are even moderately intercorrelated, interpretation of the variates by examination of the standardized regression weights (canonical weights that generate canonical variates) is practically impossible. This condition was also identified by Darlington (1968), who warned against interpreting unstable regression weights resulting from multicollinear predictors. The procedure proposed by Meredith (1964) involves computing correlations between original variables and the canonical variates, resulting in a matrix of structural coefficients. A further refinement to the variate interpretation problem is to square each of the structural coefficients (Dunham and Kravetz, 1975). These squared loadings provide a more accurate indication of the relationship between an individual variable and its canonical variate and comprise the variance matrix. The variance matrix indicates the relative importance of each variable with respect to its canonical variate, whereas the structural matrix

indicates the directionality of the relationship between each variable and its canonical variate. Table 13 includes the standardized regression weights, the structure coefficients, and the variance matrix elements relating original variables to their respective variates. Interpreting the weights in Table 13 would lead to different conclusions than inspection of the loadings when deciding which variables are important. This was a problem only with the PAQ variates, however. Many of the intercorrelations among the PAQ overall dimensions (see Table 12) were particularly high; whereas intercorrelations among the perceived job characteristics were low to moderate. As a result, many of the PAQ variables had regression coefficients with signs opposite to their associated structural coefficients. Therefore, the structural loadings and their squared counterparts were used to interpret the variates.

The canonical solution identified relationships between PAQ-based characteristics and characteristics based on incumbents' ratings. These relationships were identified across three orthogonal dimensions, or roots. More specifically, the first canonical root suggested that incumbents who perceived their jobs as physically demanding and dangerous also worked in jobs characterized by job analysts as, among other important aspects, requiring operation of machines and equipment,

engaging in physical activities, and working in unpleasant, hazardous, and/or demanding environments. The second root indicated that jobs rated by workers as requiring public interaction/service and as being high on dangerousness, also were rated most highly on PAQ scales correlated with public, customer, and/or related contacts; decision, communicating, and general responsibilities; and low in supervising, directing, and estimating. The third root suggested that jobs perceived by incumbents to be high in characteristics comprising job complexity also were determined by job analysts to have a regular work schedule with low amounts of task routine and repetitiveness. Table 14 provides additional information regarding the loadings of all job characteristics on each of the six variates.

The redundancy coefficients in Table 13 indicated that the canonical variates accounted for sizable proportions of variance in the original variables. Among the 13 PAQ dimensions, 77% of the variance was accounted for by the three significant PAQ canonical variates; and among the four incumbent-rated variables, the three PJC variates accounted for 89% of the variance. Redundancy analysis also indicated that the PAQ variates did a better job of predicting the total variance among the four original incumbent-rated variables (60%) than did the PJC variates in predicting the 13 PAQ dimensions (51%). Dunham and Kravetz (1975) suggested that

Table 14

Loadings of Job Characteristics on Canonical Variates

Job Characteristics	Canonical Variates					
	PAQ1	PAQ2	PAQ3	PJC1	PJC2	PJC3
Autonomy	04	00	33	02	-08	53
Task Identity	12	-33	30	08	-31	47
Task Significance	24	09	17	25	12	49
Skill Variety	29	-08	28	31	-07	59
Feedback from Job	10	-07	28	12	-08	51
Intellectual Demands	02	26	19	12	24	48
Job Complexity	21	-05	40	-	-	-
Public Interaction	-20	72	-06	-	-	-
Physical Demands	87	-11	-11	-	-	-
Dangerousness	85	25	10	-	-	-
PAQ Dimension 1	-	-	-	37	35	-20
PAQ Dimension 2	-	-	-	77	-20	-20
PAQ Dimension 3	-	-	-	66	30	-23
PAQ Dimension 4	-	-	-	57	-23	-21
PAQ Dimension 5	-	-	-	37	20	-28
PAQ Dimension 6	-	-	-	-73	-05	21
PAQ Dimension 7	-	-	-	63	10	-33
PAQ Dimension 8	-	-	-	78	15	-20
PAQ Dimension 9	-	-	-	81	-15	-16
PAQ Dimension 10	-	-	-	15	-53	-17
PAQ Dimension 11	-	-	-	26	56	-23
PAQ Dimension 12	-	-	-	81	-05	-22
PAQ Dimension 13	-	-	-	49	15	-34

Note. N = 223. Omitted entries are found in Table 13.

examining the unique criterion variance explained by the original predictor variables may suggest the relative predictive importance of those variables. Squared semi-partial correlations were computed and are listed in Table 13 as usefulness indices (Darlington, 1968). The usefulness indices for the PAQ variables were all very small, and suggested that individual overall dimensions were not effective predictors of the perceived characteristic variates with all dimensions taken into account. This was likely due to the high degree of intercorrelation among the overall dimensions. On the other hand, the indices for the incumbent-rated characteristics suggested more clearly their relative importance in predicting the PAQ variates.

Classification of jobs on the canonical variates.

Although the canonical solution was directly dependent upon the dimension scores assigned to each job, the solution was not based on the job categories themselves. It would be useful to determine if the canonical variates were meaningful in terms of the 16 original jobs included in the canonical correlation analysis. That is, the ranks of the jobs on the canonical variates ought to be plausible in terms of the characteristics represented by the variates. Table 15 lists the ranks, the percentage of identical ranks between canonical variates, and the Spearman rank-order correlations between canonical variates. The PJC variates (i.e., the

Table 15

Rankings of Jobs on Canonical Variates

Job Title	Canonical Variates					
	PAQ1	PJC1	PAQ2	PJC2	PAQ3	PJC3
Jet Engine Mechanic	1	3	15	14	8	13
Tactical Aircraft Technician	2	2	13	12	14	14
Aircraft Armament Technician	3	1	12	13	11	11
Patrol Officer	4	4	3	3	13	12
Materiel Facilities Supervisor	5	5	14	11	7	5
Avionics Technician	6	6	16	16	2	1
Traffic Safety Officer	7	7	4	4	1	4
Criminal Investigator	8	8	5	5	3	2
Packaging Supervisor	9	9	9	15	5	10
Munitions Operations	10	10	1	1	9	9
Air Force Recruiter	11	11	2	2	4	3
ROTC Instructor	12	12	10	10	10	8
Inventory Management: Demand Processing	13	14	6	6	16	16
Development Engineer: Electronics	14	13	8	8	12	7
Development Engineer: Aeronautical	15	15	7	7	15	15
Inventory Management: Mission Capability	16	16	11	9	6	6
<hr/>						
% Identical Ranking:	75		63		38	
Rank-order correlation (N=16):	.98***		.92***		.86***	

Note. The scores on the canonical variates of the perceived job characteristics were averaged within jobs. Ranks are from 1 (highest) to 16 (lowest).

*** $p < .0001$

variates derived from incumbent-rated job characteristics) were averaged across the incumbents within each job to derive a single ranking for each job. As indicated in Table 15, the corresponding ranks of the jobs were significantly correlated for the three pairs of variates. In addition, all of the rankings except one appeared plausible. The first pair of variates (PAQ1 and PJC1) dealt with manual, physically demanding and dangerous activities. Jobs ranked higher on these variates are blue collar and law enforcement jobs; and the lower ranked jobs are white collar, office-type jobs. The second pair of variates described jobs which deal with the public, have an element of dangerousness, and have low supervisory requirements. The job ranked highest on both variates, munitions operations specialist, did not appear to be a job likely to require public interaction. Inspection of the perceived characteristics responses, however, suggested that the incumbents did perceive the job to require public interaction (in the sense that as a military unit, they interacted frequently with personnel outside their unit). Surprisingly, however, the PAQ score for this job on Dimension 11 (Public/Customer/Related Contacts) was not high. The high ranking on the PAQ2 variate may have resulted from high scores on PAQ dimensions positively correlated with Dimension 11 (see Tables 12 and 9). An additional consideration in this case was that for the

munitions operations job, only one PAQ was available and only two incumbents were represented. Unreliability in one or both of the job characteristics instruments, therefore, may have played a part in the unexpected predicted scores on the variates. Otherwise, the remaining rankings appeared plausible. Jobs likely to require much interpersonal and public contact, such as recruiter, patrol and traffic safety officers, scored highest, whereas the shop-oriented maintenance jobs scored lowest. The third pair (PAQ3 and PJC3) described the jobs in terms of job complexity (autonomy, task identity, task significance, skill variety, feedback from the job, and intellectual demands). Here the jobs were mixed in terms of the rankings within the variates and there was less agreement in ranks between the PAQ and PJC variates.

Overall, the canonical solution appeared to identify meaningful composites among the two classes of variables that related to each other and shared significant amounts of variance. In addition, the canonical solution differentiated and ranked the jobs in a plausible manner. Therefore, the hypothesis was supported: Job characteristics derived from job analysis were related to job characteristics rated by job incumbents.

Discussion

The results presented above suggested that meaningful relationships existed between incumbents' ratings of job characteristics and characteristics derived from job analysis ratings. As discussed below, the results have implications for the taxonomic study of job characteristics, for the ongoing debate regarding the validity of perceived job characteristics, for job redesign methods, and for future research.

Implications for the Taxonomy of Job Characteristics

The present data supported the appropriateness of an expanded taxonomy of job characteristics including physical demands, dangerousness, and public interaction/service. In other research, these characteristics provided incremental validity in predicting satisfaction with work when added to the more commonly used Hackman and Oldham (1975) job scope characteristics (Zaccaro & Stone, 1988; cf. Stone & Gueutal, 1985). As discussed in the next sections, the present study supported the Stone and Gueutal (1985) set of characteristics in terms of their validity, i.e., relations with independent ratings of job activities. More fundamentally, though, the three significant canonical functions found in the present study essentially replicated the three dimensions named in the multidimensional scaling solution of Stone and Gueutal (1985). The replication was not exact, however. Stone

and Gueutal (1985) identified three independent dimensions of perceived job characteristics: physical demands/dangerousness, public interaction/service, and job complexity. In the present study, although physical demands and dangerousness formed a single canonical variate (PJC1) and job complexity formed another (PJC3), public interaction/service combined with dangerousness to form another independent variate (PJC2). This composite of public interaction, service, and dangerousness was most likely the result of the make-up of the present sample. The jobs highest on these characteristics were those that combined these elements in rather unique ways, such as police officers, detectives, and certain military jobs.

In addition to finding the Stone and Geuetal (1985) dimensions among incumbent-reports of job characteristics, however, the present study also demonstrated their existence among job analysis ratings. The three composites created from the PAQ ratings were correlated with the three composites created from the incumbent ratings and reflected essentially the same three-dimensional job characteristics framework. As importantly, however, the three PAQ composites were generated with completely independent measurement methods: both in terms of the respondents (non-incumbent job analysts versus incumbents) and in terms of the

measuring instruments (the PAQ versus the perceived characteristics scales).

Implications for the Validity of Incumbent-Rated Job Characteristics

The discussion by Fried and Ferris (1987) of the validity of perceived characteristics was also extended by the present results. That is, although prior research demonstrated that incumbents' ratings of the Hackman and Oldham core dimensions covaried with experimentally manipulated job designs and with perceptions of non-incumbents, no evidence was available as to their covariance with job analysis-derived characteristics. In the present study, the Hackman and Oldham core dimensions were combined with intellectual demands into a job complexity composite. This composite correlated with and was the single best predictor of a specific linear composite of PAQ dimensions (i.e., PAQ3). The incumbent-rated job complexity characteristics, however, were not as strongly correlated with the analyst-rated characteristics as were physical demands, dangerousness, and public interaction/service. For example, the canonical correlation analysis and the resulting job-level rankings suggested the relative weakness of the relationship between job complexity and PAQ characteristics. In the canonical correlation analysis, the correlation between the job complexity-based variate of incumbent-rated job characteristics (PJC3) and its

corresponding variate of PAQ dimensions (PAQ3) was the weakest of the three significant functions. In addition, the proportion of shared variance (see Table 14) between job complexity and an optimal composite of PAQ dimensions (PAQ3) was only .16, compared to the shared variance between public interaction/service and PAQ2 (.52), physical demands and PAQ1 (.76) or dangerousness and PAQ1 (.72). Finally, the correlation of job ranks produced from the job complexity-based variates was the lowest (.86) of the three indices. As a result, the data suggested that among the perceived characteristics studied in this research, job complexity (and its components) demonstrated the least validity using PAQ dimensions as criteria. This result may have been caused by restriction in the measurable range of job complexity affecting incumbent perceptions and the PAQ ratings. The sample variance associated with job complexity was less than one-fourth of the variance associated with either physical demands, dangerousness, or public interaction/service (see Table 8). The present sample included jobs characterized mainly as moderate to high in job complexity, whereas the jobs varied more strongly on elements of danger, public interaction, service, and physical demands. Consequently, restriction of range in job complexity in the present sample must be considered a potential cause of the relative weakness of the relationships involved in the third canonical

correlation. Another possible reason for the relative weakness in the third canonical correlation may be that the PAQ does not adequately incorporate job behaviors representative of job complexity.

Implications for Job Redesign Methods

Finally, the study of relationships between perceived job characteristics and job activities measured by the PAQ can benefit the job redesign process. In deciding which job activities to change in order to enhance desirable work outcomes, the job redesign practitioner faces many decisions. As Aldag and Brief (1979) pointed out, discussions and interviews with incumbents, supervisors, and managers are necessary before targeting specific job activities for redesign. Analyses that relate job analysis data to incumbent-rated job characteristics can provide the redesign practitioner with an empirical base for making specific job activity changes. For example, it was clear that variate PAQ2 primarily represented the degree to which a job required (a) supervision and estimating activities (Overall Dimension 10; negatively weighted) and (b) contacts with the public, customers, or related activities (Overall Dimension 11; positively weighted). It was also clear that variate PJC2 was primarily composed of the characteristic of public interaction/service. Examination of the PAQ job elements associated with Overall Dimensions 10 and 11 provides

information not available from the incumbent-rated characteristics. This additional information indicates specific job activities possibly important for understanding the perceptions of public interaction and service among incumbents in a given sample of jobs. For example, the PAQ Users Manual (Mecham et al., 1977) lists eleven activities that are correlated with scores on Supervising/Directing/Estimating (e.g., total number of personnel for whom responsible, estimating quantity, judging condition, quality). These job elements provide an enlarged data base upon which to investigate redesign options. Cause and effect assumptions, however, must be avoided. That is, one cannot assume that by increasing job activities positively related to Supervising/Directing/Estimating, a job will then require fewer Public/Customer/Related Contacts.

Implications for Future Research

Generalizability. An important additional consideration is that the present sample was small in terms of job representation and restricted in terms of the Hackman-Oldham job characteristics. Most of the sample was either law enforcement or military. Therefore, generalizations regarding the substantive nature of the functional relationships can be only tentative in the absence of cross-validation. Moreover, the generalizability resulting from random and representative selection cannot be claimed in this

study. However, the jobs were almost all from organizations which use formal job classification systems. As a result, the jobs represented in the sample are likely to be standardized across persons, places, and occasions within the organizations represented. Future research should incorporate both adequate diversity in job types and a larger number of jobs in order to provide adequate variance on all job characteristics. In the present study, there were only 16 distinct levels of PAQ-derived job characteristics. This may have exaggerated the influence of restriction of range or lack of representation of job types.

Use of the PAQ. The job analysts in the present study received no training for completing the PAQ other than reading the introductory material printed in the questionnaire booklets. Even so, it appeared that the PAQ performed satisfactorily for the purposes of this study. One reason for this may be that most of the analysts possessed relatively high levels of education and had several years experience with the rated job. When results of the PAQ are to be used for job redesign, though, analysts should probably be trained. In addition, the results of the analyses should be made known to the analysts and areas of disagreement resolved prior to defining the PAQ-derived job characteristics. The additional time and costs associated with such a

procedure are justified when an organization intends to seriously consider redesign of job activities.

Analytical approaches. Future research is needed to test the extent to which specific items of the PAQ are related to perceived characteristics. The relationships found in this study between perceived characteristics and PAQ-derived characteristics existed at a relatively high level of abstraction from the original PAQ items. That is, PAQ items were combined into overall dimensions according a unit-weighted approximation to the component score procedures typically employed in PAQ analyses. In addition, these dimension scores were then combined into higher-level composites through the canonical analysis. If the results of an analysis such as performed in the present study are to be used for applied job redesign, relationships between the PAQ job elements (items) and the canonical variates need to be examined and confirmed. With much larger sample sizes, regression analyses can examine such item-variate functional relationships. Only then can useful relationships be described between perceived characteristics and individual behaviors described by the PAQ.

A second analytical strategy recommended for future research would involve the use of linear structural relations to investigate the equivalence between PAQ-derived characteristics and incumbent-derived characteristics for predicting work outcomes. Such a

procedure can test for the presence of a significant method factor. Using the present data as an example, the canonical variates associated with each canonical root represent two methods of measuring the same job characteristic construct. For example, PAQ1 and PJC1 purportedly measure the same underlying construct, namely, a physical demands and dangerousness construct. But PAQ1 also represents a different method of measuring the construct than PJC1. Linear modeling can determine whether the three PAQ variates are differentiated from the PJC variates on the basis of the method of measurement or if the variates are better described in terms of the underlying job characteristic constructs.

A third methodological issue pertains to the analytical methods appropriate for cross-level research. This study followed the recommended procedures of Rousseau (1978, 1987). In this method, measures obtained at a global level (i.e., PAQ job dimension scores) are applied to observations at a lower level (i.e., individual job incumbents). As an alternative to treating job design at the global level, however, under some circumstances, job characteristics may be more appropriately measured with the PAQ at the individual, or position, level. This would be appropriate if positions varied widely within job categories. In either case, further research is needed on the effects of behavior-based job characteristics on individual job

perceptions and outcomes. In addition, the statistical results must be interpretable whether job characteristics are measured at the group or individual level. In the case of the former, future research should consider that bias may be present in estimates of statistical significance due to loss of independence in global scores applied as individual-level observations. In the present study, for example, the worst case situation would permit only 14 degrees of freedom (i.e., 16 unique values of PAQ dimension scores). The critical value for significance ($p < .05$) for the Pearson correlation is .497. Each of the obtained canonical correlations would still achieve statistical significance under this condition.

Conclusions

The primary purpose of this study was to examine methods for relating perceived job characteristics (derived from incumbent ratings) to independently measured job characteristics (derived from ratings of discrete work behaviors). The results indicated that such relationships existed in the present data beyond what had been previously demonstrated. Namely, incumbent perceptions of specified job characteristics were associated with discrete behavioral counterparts. Because these relationships were demonstrated in terms of linear composites, future research is needed to elaborate on and confirm these findings.

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Appendix A
Definitions of Incumbent-Rated Job Characteristics

Definitions of Incumbent-Rated Job Characteristics

(Note. Numbers in parentheses indicate items on the Job Response Survey measuring that characteristic; "r" indicates an item is reverse-scored.)

Skill variety. The degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the employee. (9, 12, 15r)

Task identity. The degree to which the job requires completion of a "whole" and identifiable piece of work - - i.e., doing a job from beginning to end with a visible outcome. (8, 13r, 18)

Task significance. The degree to which the job has a substantial impact on the lives or work of other people - - whether in the immediate organization or in the external environment. (10, 16, 21r)

Autonomy. The degree to which the job provides substantial freedom, independence, and discretion of the employee in scheduling the work and in determining the procedures to be used in carrying it out. (7, 17r, 20)

Feedback from the job itself. The degree to which carrying out the work activities required by the job results in the employee obtaining direct and clear information about the effectiveness of his or her performance. (11, 14, 19r)

Public interaction. The degree to which the job requires a worker to provide services to and interact with people who are not part of the work group. (45, 56, 59r)

Physical demands. The degree to which the job requires physical activity, strength, outdoor work, and results in workers getting dirty. (46, 49, 57, 58r)

Dangerousness. The degree to which the job exposes the worker to health or injury hazards. (48, 51, 55)

Intellectual demands. The degree to which the job requires technical training, verbal skills, or processing large amounts of information. (50, 53, 54)

Job complexity. The unit-weighted composite of autonomy, task identity, skill variety, task significance, feedback from the job itself, and intellectual demands.

Appendix B

Cover Sheet for Position Analysis Questionnaire

: : POSITION ANALYSIS QUESTIONNAIRE (PAQ) : :

You have been asked to complete this job analysis questionnaire for a job of interest to this research project. The PAQ (McCormick, Jeanneret, & Mecham, 1972) was developed to study what workers do on their jobs, and should take no more than 50 - 60 minutes to complete.

As part of this research, I ask that you complete the PAQ as fully as you can. No information that you provide will be made available to your organization, at any level, in such a way that you or other individuals will be identified. Your responses on this questionnaire will remain **STRICTLY CONFIDENTIAL**. Also, no other information will be obtained from any other sources concerning you as an individual. While it is important for the research purposes that you participate, if you feel that you do not wish to participate or do not wish to answer specific questions, you are not required in any way to do so.

Rick S. Tallarigo
Graduate Student, Bowling Green State University

INSTRUCTIONS:

1. Please complete the PAQ for job: _____
2. Select a time and place to complete the PAQ without interruptions or distractions. Return this page with your PAQ in the envelope provided.
3. Do not make any marks on the PAQ booklet. Record your responses by filling in the appropriate circles on the blue answer sheet with the No. 2 pencil.
4. Please omit the items which are crossed out.
5. As many as one-third to one-half of the items may not apply to the job you are rating. **For items which do not apply, fill circle 1 and circle 5 completely.**
6. Please answer the following questions:
 - a. What is your job title? _____
 - b. How long have you been associated with the job you are rating? That is, how much time have you accumulated in working on the job, supervising others who work on the job, and/or working closely with others who work on the job? (check one)

() six months or less
 () more than six months but less than one year
 () at least one year but less than two years
 () at least two years but less than five years
 () five years or more
 - c. How familiar are you with the job you are rating? (circle a number)

1	2	3	4	5
Not Familiar At All	A Little Familiar	About Average	Quite Familiar	Extremely Familiar

Now please begin by entering your name, sex, education, and birth date on the answer sheet. Then begin working on the PAQ which begins on the next page. When you are finished, please return this sheet along with the PAQ materials. Thank you.

Appendix C
Job Response Survey

: : JOB RESPONSE SURVEY : :

Please take a few moments to complete the attached questionnaire which was developed for doctoral degree research purposes. This questionnaire was developed to study how workers describe their jobs and their feelings about their jobs.

As part of this research, I ask that you complete the questionnaire as fully as you can. **No information provided by you will be made available to your organization in such a way that you as an individual can be identified.** Your responses on this questionnaire will remain STRICTLY ANONYMOUS. Do not put your name on the questionnaire. Also, please be assured that, if you complete this questionnaire, no other information will be obtained from any other sources concerning you as an individual. While it is important for the research purposes that you participate and answer every question, if you feel that you do not wish to participate or do not wish to answer specific questions, you are not required in any way to do so.

General Instructions:

On the following pages, you will find several different kinds of questions about you and your current job. Specific instructions are given at the start of each section. Please read them carefully. It should take no more than 20 - 30 minutes to complete the entire questionnaire. Please move through it quickly.

The questions are designed to obtain *your* perceptions of your job and *your* reactions to it.

There are no trick questions. Please answer each item as honestly and frankly as possible.

When you have completed the questionnaire, please return it in the envelope provided.

Thank you for your cooperation,

Richard S. Tallarigo
Graduate Student, Bowling Green State University

1: BACKGROUND DATA SECTION

1. How long have you been employed: (a) in your current job? _____ years
(b) by your current organization? _____ years
2. What is your current job title? _____
3. How similar is your work to that of co-workers who have the same job title?

()	()	()	()	()
Very	Somewhat	About the	Quite	Very
Different	Different	Same	Similar	Similar
4. (a) Age on last birthday (in years) _____ (b) Sex: () Male () Female
5. What is your Social Security number? _____
6. Check the highest level of education you've completed.

{	Did not graduate from high school
{	High school graduate (either diploma or certificate)
{	Some college/technical school
{	2 year Associate degree from college/technical school
{	Bachelor's Degree (AB, BS, BA, etc.)
{	Masters Degree (MS, MA, etc.)
{	Doctoral Degree (PhD, EdD, MD, JD etc.)

2: JOB DESCRIPTION SECTION I

Section 2-A

This part of the questionnaire asks you to describe your job as objectively as you can.

Please do *not* use this part of the questionnaire to show how much you like or dislike your job. Questions about that will come later. Instead, try to make your descriptions as accurate and as objective as you possibly can.

A sample question is given below:

A. To what extent does your job require you to work with mechanical equipment?

1-----2-----3-----4-----5-----6-----7

Very little; the
job requires almost
no contact with
mechanical equip-
ment of any kind.

Moderately

Very much; the job
requires almost
constant work with
mechanical
equipment.

You are to circle the number which is the most accurate description of your job.

If, for example, your job requires you to work with mechanical equipment a good deal of the time - but also requires some paperwork - you might circle the number six, as was done above.

Now begin with the questions on the next page:

7. How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing the work?

1-----2-----3-----4-----5-----6-----7

Very little; the job gives me almost no personal "say" about how and when the work is done.

Moderate autonomy; many things are standardized and not under my control, but I can make some decisions about the work.

Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

8. To what extent does your job involve doing a "whole" and identifiable piece of work? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small part of the overall piece of work, which is finished by other people or by automatic machines?

1-----2-----3-----4-----5-----6-----7

My job is only a tiny part of the overall piece of work; the results of my activities cannot be seen in the final product or service.

My job is a moderate sized "chunk" of the overall piece of work; my own contribution can be seen in the final outcome.

My job involves doing the whole piece of work, from start to finish; the results of my activities are easily seen in the final product or service.

9. How much variety is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?

1-----2-----3-----4-----5-----6-----7

Very little; the job requires me to do the same routine things over and over again.

Moderate variety.

Very much; the job requires me to do many different things, using a number of different skills and talents.

10. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?

1-----2-----3-----4-----5-----6-----7

Not very significant; the outcomes of my work are not likely to have important effects on other people.

Moderately significant.

Highly significant; the outcomes of my work can affect other people in very important ways.

11. To what extent does *doing the job itself* provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing - aside from any "feedback" co-workers or supervisors may provide?

1-----2-----3-----4-----5-----6-----7

Very little; the job itself is set up so I could work forever without finding out how well I am doing.

Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.

Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

Section 2 - B

Listed below are a number of statements which could be used to describe a job. You are to indicate whether each statement is an accurate or an inaccurate description of your job. Once again, please try to be as objective as you can in deciding how accurately each statement describes your job - regardless of whether you like or dislike your job. Write a number in the blank beside each statement, based on the following scale:

How accurate is the statement in describing your job?

1	2	3	4	5	6	7
Very	Mostly	Slightly	Uncertain	Slightly	Mostly	Very
Inaccurate	Inaccurate	Inaccurate		Accurate	Accurate	Accurate

- ____ 12. The job requires me to use a number of complex or high-level skills.
- ____ 13. The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end.

How accurate is the statement in describing your job?

- | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------|---|------------|------------|-----------|----------|----------|----------|
| | Very | Mostly | Slightly | Uncertain | Slightly | Mostly | Very |
| | Inaccurate | Inaccurate | Inaccurate | | Accurate | Accurate | Accurate |
| _____ 14. | Just doing the work required by the job provides many chances for me to figure out how well I am doing. | | | | | | |
| _____ 15. | The job is quite simple and repetitive. | | | | | | |
| _____ 16. | This job is one where a lot of other people can be affected by how well the work gets done. | | | | | | |
| _____ 17. | The job denies me any chance to use my personal initiative or judgment in carrying out the work. | | | | | | |
| _____ 18. | The job provides me the chance to completely finish the pieces of work I begin. | | | | | | |
| _____ 19. | The job itself provides very few clues about whether or not I am performing well. | | | | | | |
| _____ 20. | The job gives me considerable opportunity for independence and freedom in how I do the work. | | | | | | |
| _____ 21. | The job itself is not very significant or important in the broader scheme of things. | | | | | | |

3: JOB ATTITUDE SECTION

Section 3-A

Insert a check mark between each of the following pairs of adjectives so as to best describe your evaluation of the job you perform. Consider only your reaction to the work itself - not the pay, supervision, co-workers, or promotion opportunity associated with your work. Use only one check per line. Be certain to place your check within only one of the seven scale points for each pair of adjectives. Example : ✓ :

- | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---------------|
| 22. Frustrating | : | : | : | : | : | : | : | Gratifying |
| 23. Satisfying | : | : | : | : | : | : | : | Dissatisfying |
| 24. Boring | : | : | : | : | : | : | : | Interesting |
| 25. Good | : | : | : | : | : | : | : | Bad |
| 26. Liked | : | : | : | : | : | : | : | Disliked |
| 27. Pleasant | : | : | : | : | : | : | : | Unpleasant |
| 28. Nice | : | : | : | : | : | : | : | Awful |
| 29. Sad | : | : | : | : | : | : | : | Happy |
| 30. Pleasurable | : | : | : | : | : | : | : | Painful |
| 31. Pleasing | : | : | : | : | : | : | : | Annoying |

Instructions. Draw a circle around the face that best expresses how you feel about the work you do on your job. Again, consider only the work itself - not the pay, supervision, co-workers, or promotion opportunity associated with the work.



Section 3-B

Now insert a check mark between each of the following pairs of adjectives so as to best describe your overall evaluation of the job you perform. This includes all aspects of your job - for example, your pay, supervision, co-workers, promotion opportunity, and the work itself.

- | | | |
|-----------------|-------------------------------|---------------|
| 33. Frustrating | : _ : _ : _ : _ : _ : _ : _ : | Gratifying |
| 34. Satisfying | : _ : _ : _ : _ : _ : _ : _ : | Dissatisfying |
| 35. Boring | : _ : _ : _ : _ : _ : _ : _ : | Interesting |
| 36. Good | : _ : _ : _ : _ : _ : _ : _ : | Bad |
| 37. Liked | : _ : _ : _ : _ : _ : _ : _ : | Disliked |
| 38. Pleasant | : _ : _ : _ : _ : _ : _ : _ : | Unpleasant |
| 39. Nice | : _ : _ : _ : _ : _ : _ : _ : | Awful |
| 40. Sad | : _ : _ : _ : _ : _ : _ : _ : | Happy |
| 41. Pleasurable | : _ : _ : _ : _ : _ : _ : _ : | Painful |
| 42. Pleasing | : _ : _ : _ : _ : _ : _ : _ : | Annoying |

Instructions. Now draw a circle around the face that best expresses how you feel about your job in general. Again, consider your overall evaluation of your job.



4: JOB DESCRIPTION SECTION II

Instruction: Read each of the following statements and enter the number corresponding to how much you agree or disagree with each statement about your job. Use the following scale:

- | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|------------|----------|-----------|----------|------------|----------|
| STRONGLY | MODERATELY | SLIGHTLY | NEITHER | SLIGHTLY | MODERATELY | STRONGLY |
| DISAGREE | DISAGREE | DISAGREE | AGREE NOR | AGREE | AGREE | AGREE |
| | | | DISAGREE | | | |

- ___ 44. In doing my job, I frequently move from one location to another.
- ___ 45. In doing my work, I provide services to people who are not employed by the business or organization for which I work.
- ___ 46. My job requires me to be very physically active.
- ___ 47. My job requires a lot of cooperative work with other people.
- ___ 48. My job is highly risky; it exposes me to serious health hazards.
- ___ 49. My job requires me to use a great deal of physical strength.
- ___ 50. A great deal of technical training is needed to perform well on my job.
- ___ 51. My job is highly risky; it could easily result in me being fatally injured.
- ___ 52. My job can be done adequately by a person working alone--without talking or checking with other people.

1	2	3	4	5	6	7
STRONGLY	MODERATELY	SLIGHTLY	NEITHER	SLIGHTLY	MODERATELY	STRONGLY
DISAGREE	DISAGREE	DISAGREE	AGREE NOR	AGREE	AGREE	AGREE
			DISAGREE			

- ___ 53. My job requires me to have a high level of verbal skill (that is, above average speaking and writing ability).
- ___ 54. My job requires me to process large amounts of information.
- ___ 55. In doing my job I must constantly be concerned with the health and safety of others.
- ___ 56. In doing my work, I interact directly with many people who are not employed by the business or organization for which I work.
- ___ 57. In doing my job, I generally get quite dirty.
- ___ 58. Almost all of my work is done indoors (that is, inside buildings).
- ___ 59. In doing my job, I interact mainly with other employees of the business or organization for which I work.

5: Future Job Plans

Listed below are a number of statements concerning your intentions to leave or remain with your current organization. Consider each of the following statements, then place the number in the space provided that best indicates how much you agree or disagree with the statement. Use the following response possibilities:

1	2	3	4	5	6	7
STRONGLY	MODERATELY	SLIGHTLY	NEITHER	SLIGHTLY	MODERATELY	STRONGLY
DISAGREE	DISAGREE	DISAGREE	AGREE NOR	AGREE	AGREE	AGREE
			DISAGREE			

- ___ 60. I frequently feel like quitting my job.
- ___ 61. I intend to leave this organization within the next year.
- ___ 62. Barring unforeseen circumstances, I'll remain with this organization until retirement.
- ___ 63. The offer of a bit more money with another employer would not make me think seriously of changing my job.
- ___ 64. If I could find a good substitute job, I probably wouldn't stay with this job.

Thank you for the time you have spent completing this questionnaire.

Please quickly review this questionnaire before you return it to make sure no items have been skipped unintentionally.